DOCUMENT RESUME

ED 400 444 CE 072 814

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TITLE Fieldcrest Cannon, Inc. Advanced Technical Preparation. Statistical Process Control (SPC). PRE-SPC I. Instructor Book.
INSTITUTION Workforce Education Services, Columbus, GA.
PUB DATE 96
NOTE 115p.; For related documents, see CE 072 815-816.
PUB TYPE Guides - Classroom Use - Teaching Guides (For Teacher) (052)

EDRS PRICE MF01/PC05 Plus Postage.
DESCRIPTORS Adult Basic Education; Behavioral Objectives; *Calculators; Decimal Fractions; *Industrial Training; Learning Activities; Lesson Plans; *Numeracy; Pretests Posttests; *Statistical Analysis; Worksheets
IDENTIFIERS *Statistical Process Control

ABSTRACT

This instructor guide, which was developed for use in a manufacturing firm's advanced technical preparation program, contains the materials required to present a learning module that is designed to prepare trainees for the program's statistical process control module by improving their basic math skills and instructing them in basic calculator operation. The guide is divided into five sections. The first section contains the following preliminary information: individual assessment sheet, instructor notes, and primary objectives. The second section is a course outline, and the third section contains the module lessons and worksheets, which are devoted to the following topics: using a calculator, calculating totals, calculating averages, calculating process averages, rounding off decimals, and calculating ranges. The final two sections consist of answers to the worksheets and pretests and posttests. (MN)

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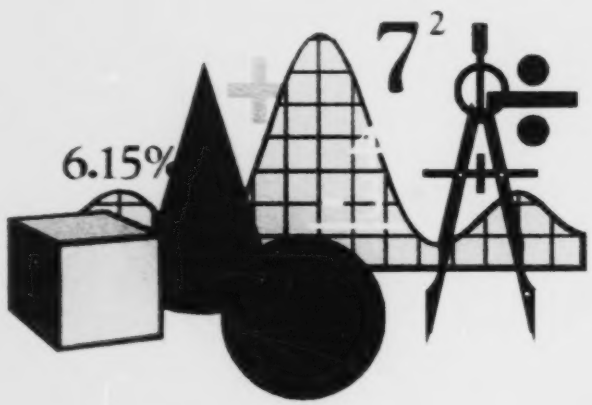
Fieldcrest Cannon, Inc.
Advanced Technical Preparation
Statistical Process Control (SPC)

PRE-SPC I
Instructor Book



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PRE-SPC I

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1996

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PRE-SPC I

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   Instructor Notes
   Primary Objectives

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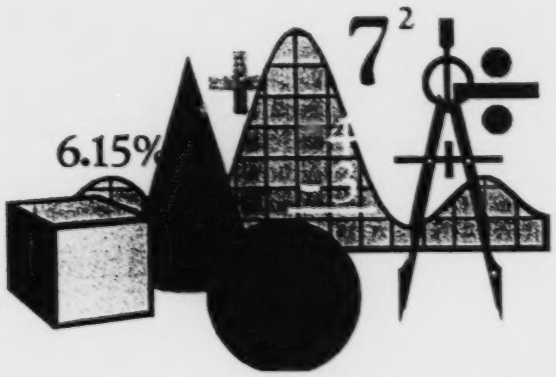
   - Calculating Averages
   - Calculating Process Averages
   - Rounding Off Decimals
   - Calculating Ranges

3. PRE SPC Lessons and Worksheets

4. Answer Key

5. Pre- and Posttests



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PRE-SPC I
Individual Assessment Sheet

Associate Name _____

Social Security Number __ __ __ - __ __ - __ __ __ __

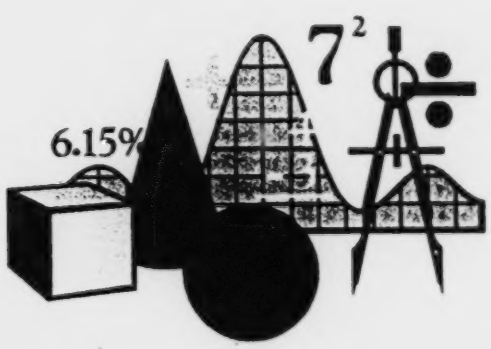
Plant _____ Location _____

Pretest *PRE-SPC I* score _____ Instructor _____

Date of Pretest _____ Comments _____

Posttest *PRE-SPC I* score _____ Instructor _____

Date of Posttest _____ Comments _____



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PRE-SPC I

Instructor Notes

- Administer a PRE-SPC I pretest
  Forward all graded pretest to: Workforce Education Services
  4501 Sears Road
  Columbus, Georgia 31907-1762

- Each associate must have access to a calculator

- Encourage associates to write words that they do not know or understand in their vocabulary notebooks (PRE-SPC I participants will need a vocabulary notebook)

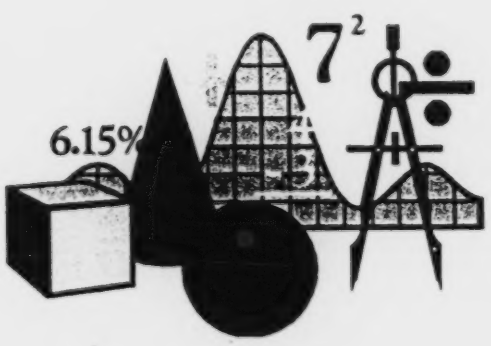
- The following books are an integral part of the PRE-SPC I curriculum:

  1. Contemporary's Math Skills That Work
     A Functional Approach for Life and Work (Book 1)

  2. Contemporary's Math Skills That Work
     A Functional Approach for Life and Work (Book 2)

- PRE-SPC I mastery level 90% (number correct /total)

- Administer a PRE-SPC I posttest
  Forward all graded posttest to: Workforce Education Services
  4501 Sears Road
  Columbus, Georgia 31907-1762



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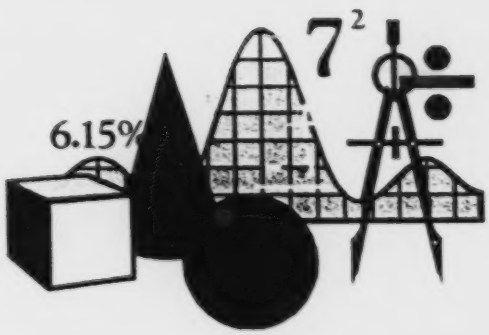
PRE-SPC I

Primary Objectives

Primary Objectives for PRE-SPC I

- Improve associates' basic math skills
- Instruct associates on how to use a calculator
  Basic Calculator Operations
- Assist associates in preparing for participation in SPC Training



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World Class Manufacturer
World Class Workforce

Statistical Process Control

SPC

Fielderest Cannon, Inc.
Advanced Technical Preparation (ATP)

PRE-SPC

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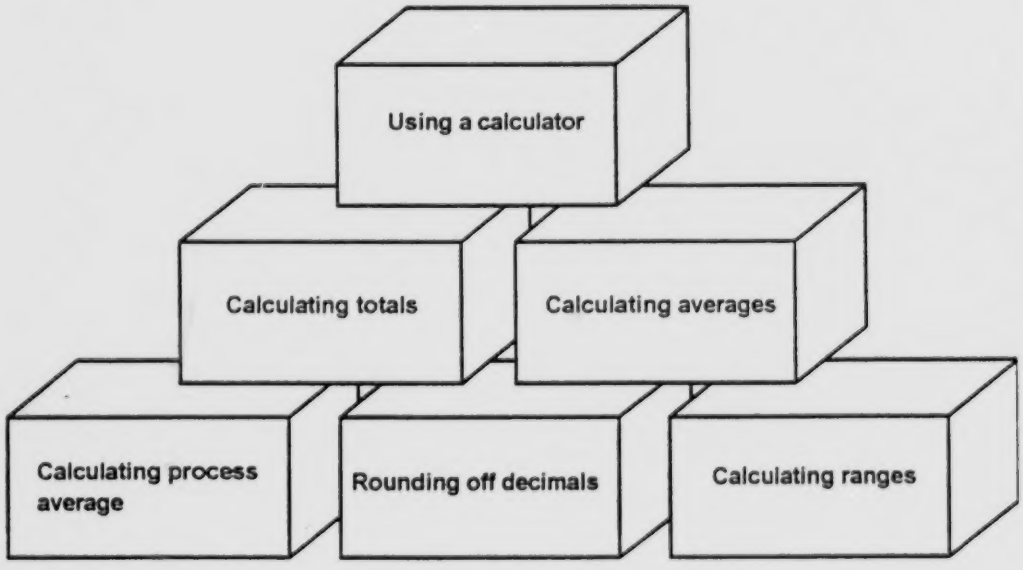
SECTION OUTLINE

Introduction

Statistical Process Control (SPC)
PRE-SPC I



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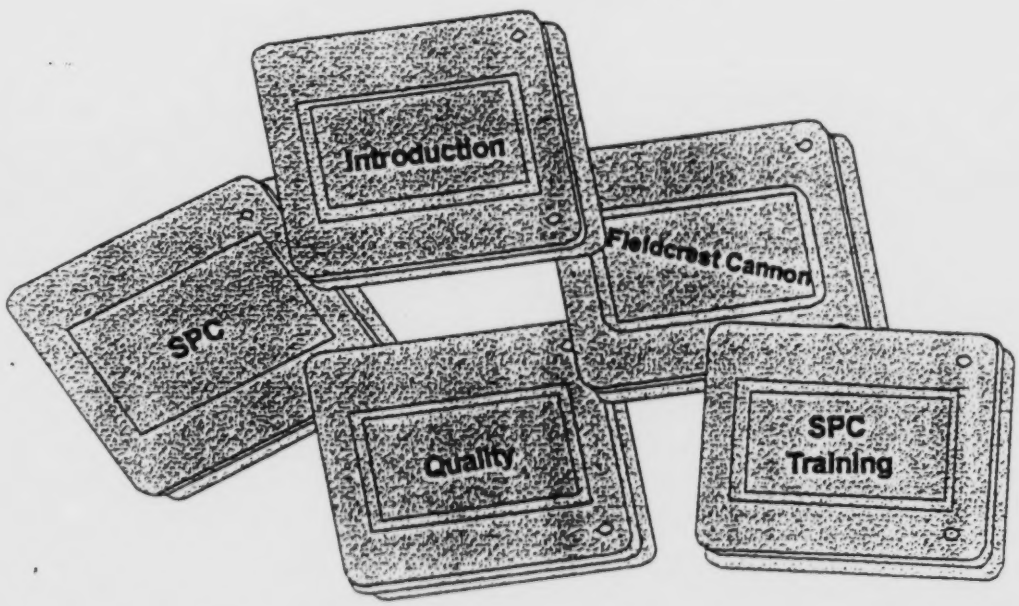

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Global Competition

Directions

- Read the following text
- Circle words that you do not know or understand
- Ask your instructor to say the circled words
- Include the circled words and definitions in your vocabulary notebook
- Practice reading the text aloud

Fieldcrest Cannon, Inc. has to compete worldwide for its customers. Therefore, new technology and a skilled workforce are essential in attaining a world class status. Technology will keep the company from falling behind other manufacturers, and upgraded associate skills will keep Fieldcrest Cannon competitive in the world market.

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GLOBAL COMPETITION

Directions
- Answer the following question
- Mark a ✓ beside the correct answer

What will help Fieldcrest Cannon become a strong competitor in the world market?

_____ 1. Old technology with old machinery

_____ 2. Upgraded associate skills and new technology

_____ 3. Sell only in the United States

_____ 4. New technology and more down time

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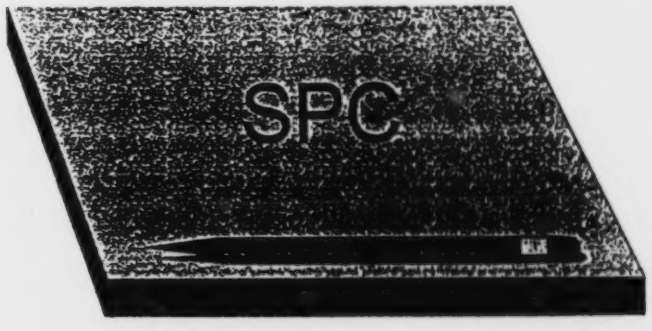
Directions

- Read the following text
- Circle words that you do not know or understand
- Ask your instructor to say the circled words
- Include the circled words and definitions in your vocabulary notebook
- Practice reading the text aloud

Statistical Process Control (SPC)

SPC is a technique for controlling the quality of a process. The associates' responsibilities include the following:

- Record data on the process
- Alert management of any situations that are out of control
- Inform management of situations that could result in defective parts and products
- Provide recommendations on situations that could result in defective parts and products
- Participate in implementing approved recommendations



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SPC

Direction
Circle the best answer.

1. SPC is an acronym for

   a. statistical progress center

   b. standard process center

   c. statistical process control

   d. standard process control

2. The associates' responsibilities in working with SPC include

   a. record data on the process

   b. alert management of situations that are out of control

   c. provide recommendations on situations that could result in defective parts or products.

   d. all of the above

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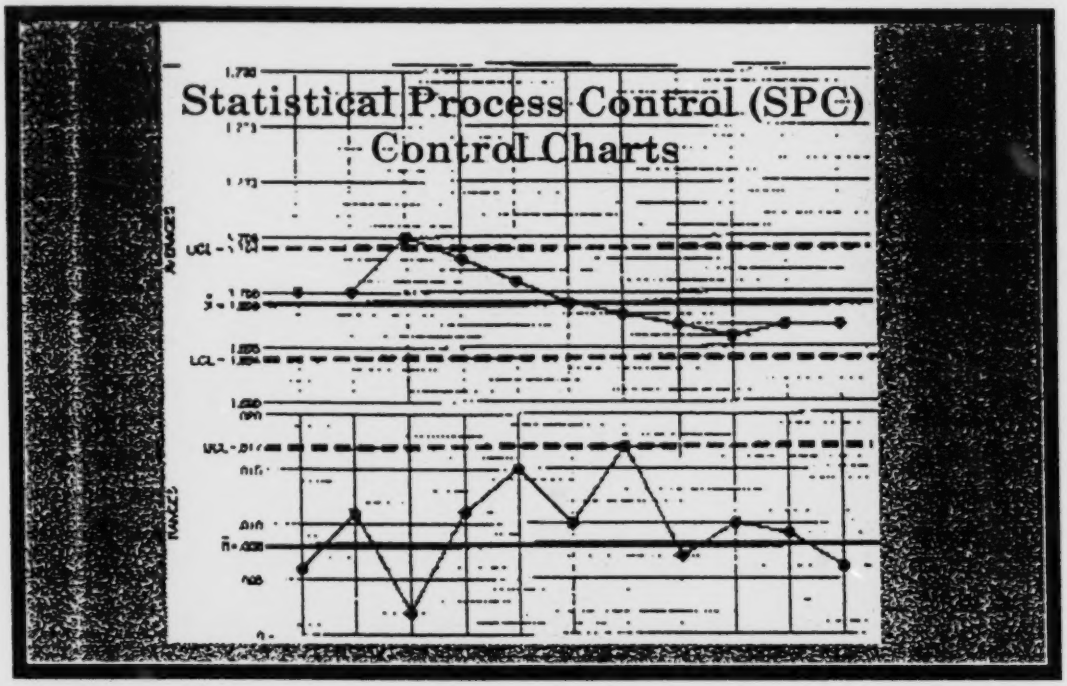

Directions

- Read the following text
- Circle the words you do not know or understand
- Ask your instructor to say the circled words
- Include the circled words and definitions in your vocabulary notebook
- Select a partner and read the text aloud -- take turns

SPC's main tool is the *control chart*. The charts are used to record, calculate, plot data, and connect plotted points to find a pattern. SPC charts allow associates to recognize whether a process is going to produce defects or errors. Therefore, associates may take corrective action to avoid production problems.

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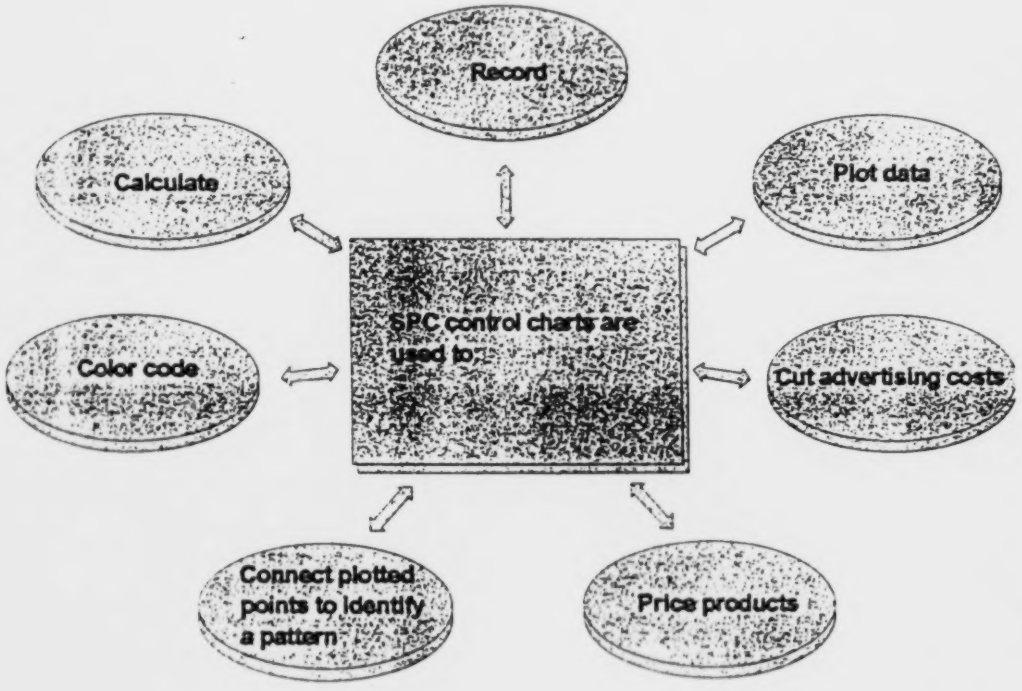
Direction

Place an ✕ over the ovals that are not functions of SPC control charts.



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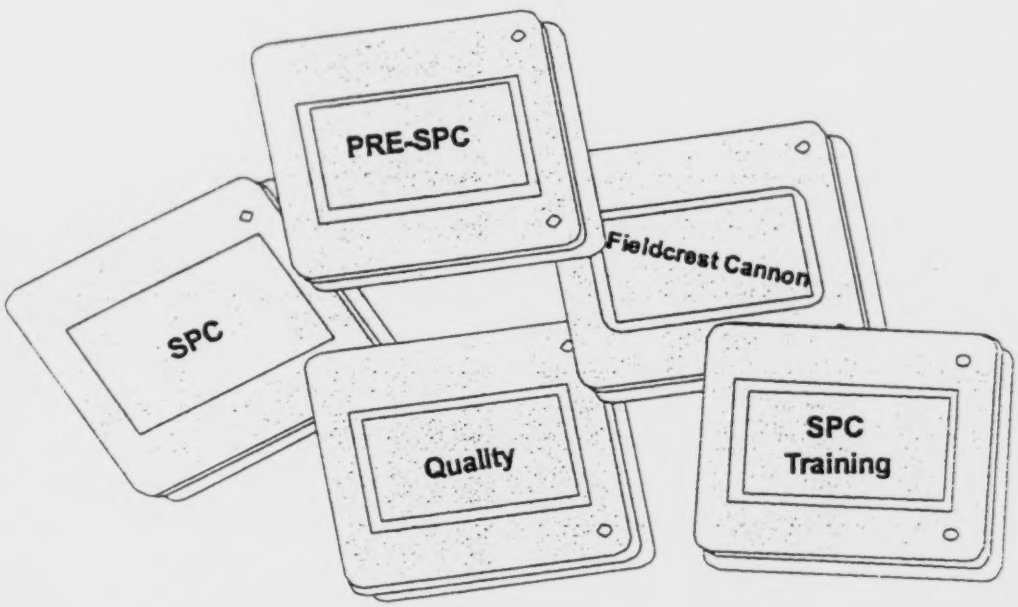

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PRE-SPC

Fieldcrest Cannon associates will review specific math skills before working with SPC control charts. These skills include the following:

1. Using a calculator
2. Calculating totals
3. Calculating averages
4. Calculating the process average
5. Rounding off decimals
6. Calculating ranges

Directions

- Find and circle the following words in the word puzzle
- The words may be written across, down, up, diagonally, backwards

calculator total process number range average decimal round

r	o	w	b	e	a	t	s	t	p	q
c	a	l	c	u	l	a	t	o	r	a
x	r	n	o	r	i	m	o	p	o	n
m	o	u	g	o	o	d	u	g	c	p
a	p	m	p	e	a	k	i	n	e	y
k	m	b	u	p	s	e	e	t	s	b
a	v	e	r	a	g	e	t	o	s	t
p	n	r	b	e	e	k	s	p	u	o
u	p	b	o	o	k	e	n	d	o	t
t	a	m	w	u	y	r	a	y	l	a
b	x	o	t	i	n	e	e	d	o	l
l	a	m	i	c	e	d	e	e	d	s

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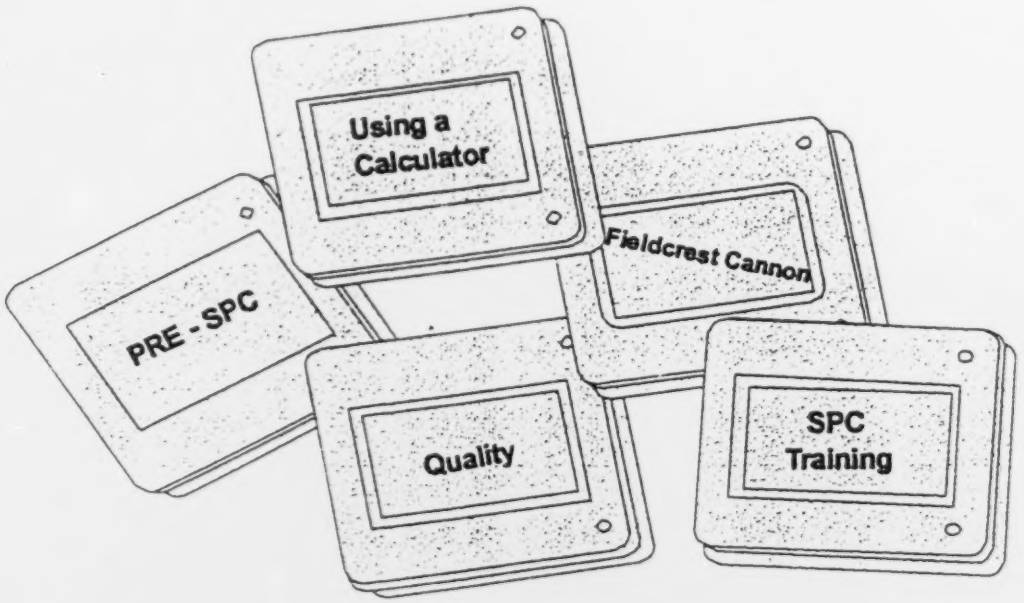

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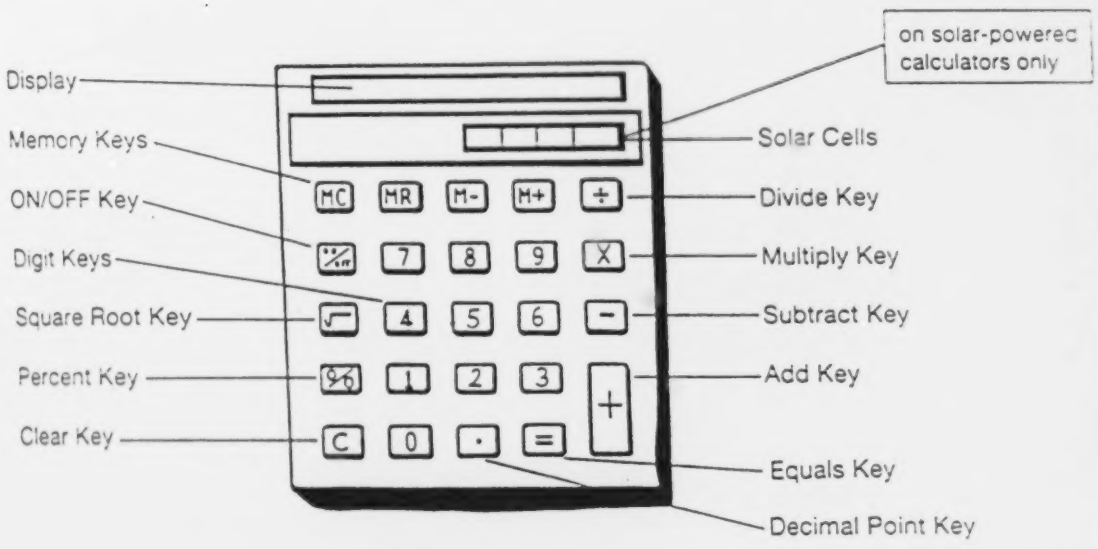
BASIC CALCULATOR OPERATIONS



Direction
Read the following text

Calculators are important in the study of math. The calculator above is probably similar to one you've seen, or one you may be using. You use a calculator by pressing different keys in the correct order.

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BASIC CALCULATOR OPERATIONS

Directions

- Answer the following questions:
  a. How does a calculator work?
  b. Do you use a calculator at work or home? Explain.
  c. What arithmetic operations can you perform on a calculator?
  d. Do you have a personal calculator?
  e. Do you have access to a calculator at work?
- Write your answers in complete sentences.

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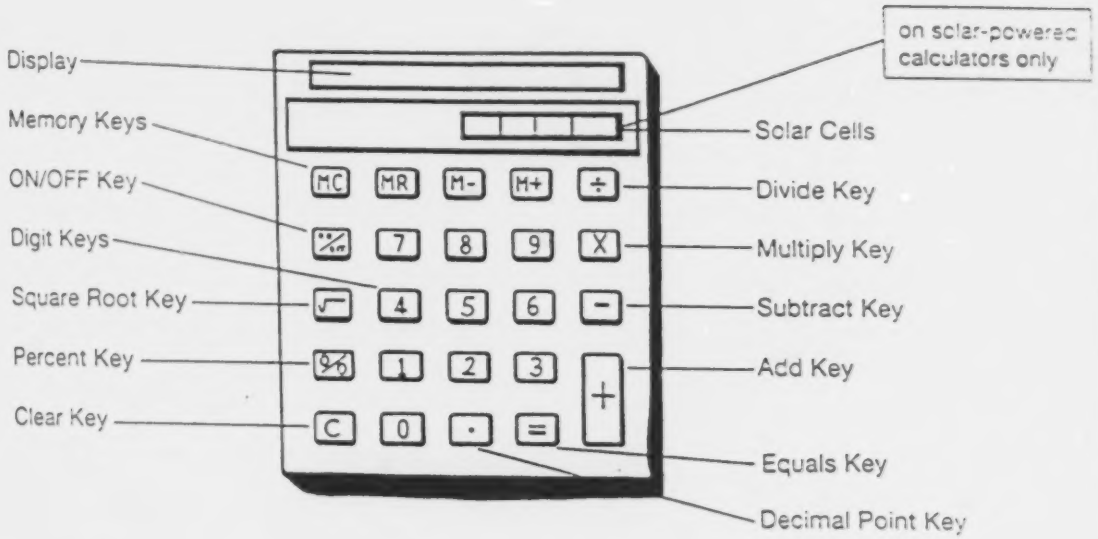
BASIC CALCULATOR OPERATIONS



Direction
Read the following text

Notice the location of each of the following keys:

- A key on the left turns the calculator on and off.
  For purposes of this section, we will not be working with the memory, square root, or percent keys.

- There is a digit key for each number from 1 to 9, plus a key for 0. There is also a key for a decimal point.

- A key for each major arithmetic operation can be found along the right hand side. These operations include dividing, multiplying, subtracting, and adding.

- An "equals" (=) key can be found on the bottom row.

- The key marked "C" stands for clear. Press this key whenever you have finished doing one problem and want to do another. This key clears the calculator so you can start over.

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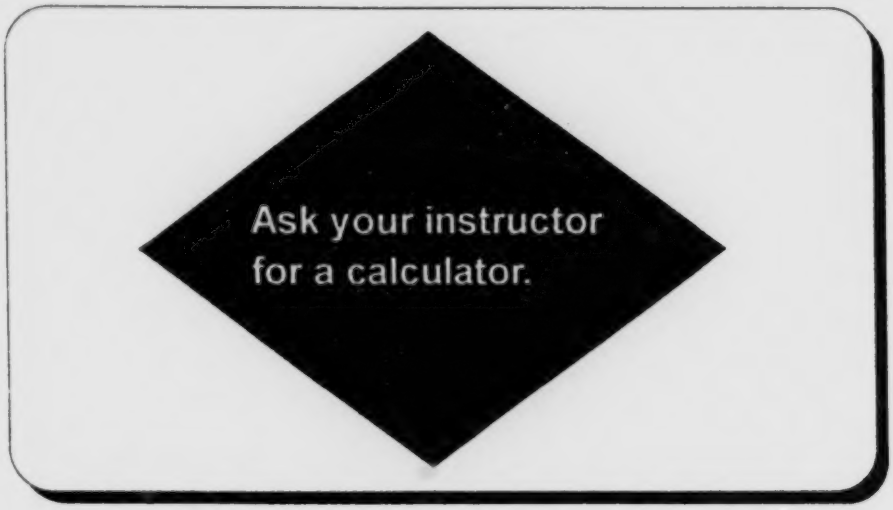
BASIC CALCULATOR OPERATIONS



Directions:

- Complete the following example
- Ask your instructor for help -- if needed

Example #1

Enter 4,610 on your calculator, press keys shown at right.

	Press Keys	Display Reads
	C	
Do not enter comma →	4	4.
	6	46.
	1	461.
	0	4610.

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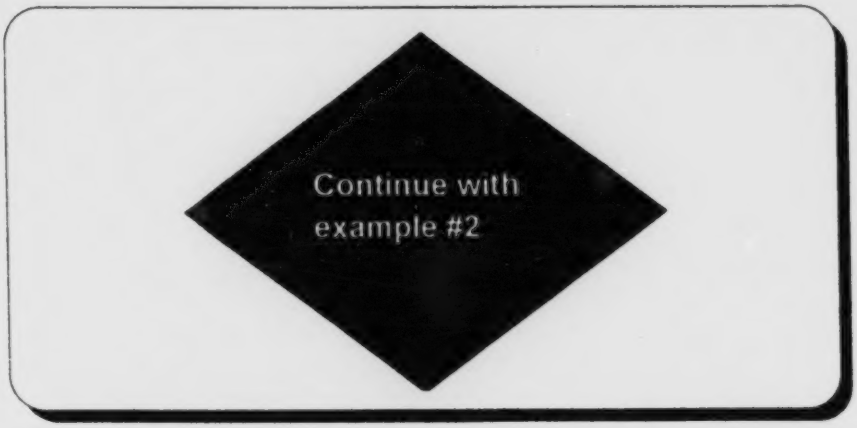
BASIC CALCULATOR OPERATIONS



Directions:
- Complete the following example
- Ask your instructor for help -- if needed

Example #2

Enter $4.68 on your calculator, press keys shown at right.

Enter decimal point to separate dollars from cents. →

Press Keys	Display Reads
C	0.
4	4.
.	4.
6	4.6
8	4.68

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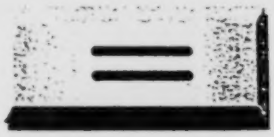
BASIC CALCULATOR OPERATIONS -- ADDITION

Example #1
Adding Two Numbers

- The add key is used to add two numbers.

- The equals key will display the answer.



- Remember: Press "C" to clear the calculator's display before starting each new problem.

Direction
Use a calculator to work the following example:

Example #1

To add 43 and 18 on a calculator, press keys as shown at right.

Enter arithmetic operation →

Press Keys	Display Reads
C	0.
43	43.
+	43.
18	18.
=	61.

Answer: 61

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BASIC CALCULATOR OPERATIONS -- ADDITION

Example #2
Adding Three or More Numbers

- Enter each number and press the add key. *(Reference example #2)*

- Press the *equals* key after entering the final number.

Direction
Use a calculator to work the following example:

Example #2

Add:
$3.25, $1.50, and $3.75

	Press Keys	Display Reads
	C	0.
	3.25	3.25
Enter arithmetic operation →	+	3.25
	1.50	1.50
Enter arithmetic operation →	+	4.75
	3.75	3.75
	=	8.50

Answer: $8.50

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BASIC CALCULATOR OPERATIONS -- ADDITION

Directions

- Solve the following problems with a calculator
- Write your answers in the blocks

Calculator Discovery

- The calculator display does not show a [+] sign
- A final answer appears after you press [=]

ADDING TWO NUMBERS

37	153	381	$1,152	$6.59
+ 21	+ 20	+ 126	+ 953	+ .98

ADDING THREE NUMBERS

21	121	381	$1,252	$8.69
10	93	425	878	1.52
+ 15	+ 68	+ 116	+ 593	+ .89

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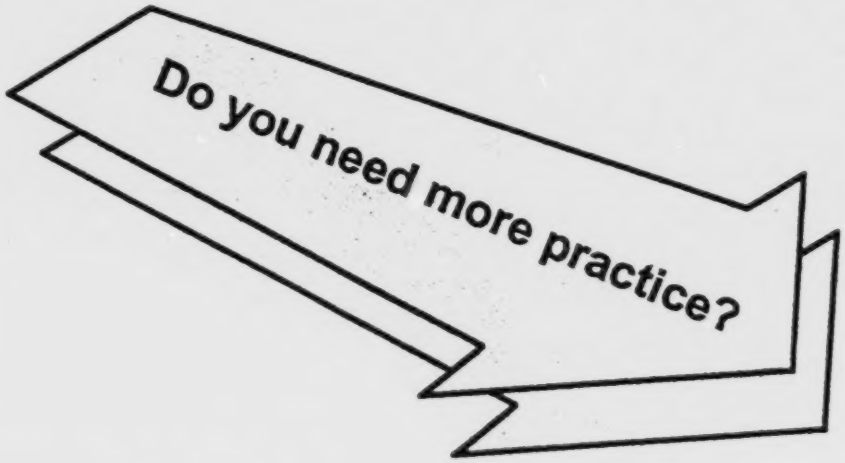
BASIC CALCULATOR OPERATIONS -- ADDITION



Ask your instructor for the book, Math Skills That Work -- A Functional Approach for Life and Work -- Book 1.

Complete pages 33-46 on *Focus on Calculators*

Note: Not all calculators work like the one in this section. However, this is a good example of one rather common, inexpensive calculator.

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BASIC CALCULATOR OPERATIONS -- SUBTRACTION

Example #1
Subtracting One Number From Another

- The subtract key is used to subtract two numbers.

- The equals key will display the answer.

- Remember, press "C" to clear the calculator's display before starting each new problem.

Direction
Use a calculator to work the following example:

Example #1

Subtract 43 from 118 on your calculator.

Enter arithmetic operation →

Answer: 75

Press Keys	Display Reads
C	0.
118	118.
–	118.
43	43.
=	75.

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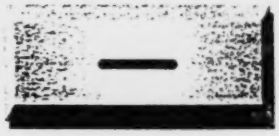
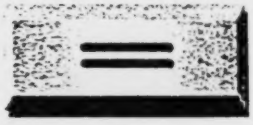
BASIC CALCULATOR OPERATIONS -- SUBTRACTION

Example #2
Subtracting Two or More Numbers

- Enter each number and press the subtract key. *(Reference example #2)*



- Press the "equals" key after entering the final number.



Direction
Use a calculator to work the following example:

Example #2

Subtraction:
Sam has $650.25 in his account. He must buy machine parts for $390.74 and office supplies for $199.95. How much money will be left in Sam's account?

	Press Keys	Display Reads
	C	0.
	650.25	650.25
Enter arithmetic operation →	-	650.25
	390.74	390.74
Enter arithmetic operation →	-	259.51
	199.95	199.95
	=	59.56

Answer: $59.56

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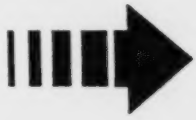
BASIC CALCULATOR OPERATIONS -- SUBTRACTION

Directions

- Solve the following problems with a calculator
- Write the answers in the blocks



Calculator Discovery

- The calculator display does not show a [-]sign
- A final answer appears after you press [=]

SUBTRACT ONE NUMBER FROM ANOTHER

44	168	881	$1,588	$8.78
- 20	- 28	- 665	- 798	- .56

SUBTRACT TWO OR MORE NUMBERS

88 - 35 - 7	=	
247 - 105 - 55 - 33	=	
$150.00 - $55.88 - $25.99 - $15.00	=	

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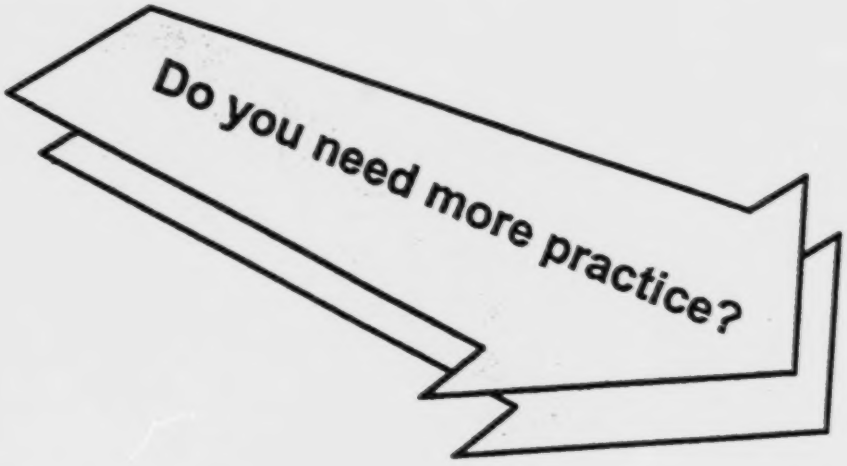
BASIC CALCULATOR OPERATIONS -- SUBTRACTION



Ask your instructor for the book, Math Skills That Work -- A Functional Approach for Life and Work -- Book 1.

Complete pages 63-68 on *Focus on Calculators*

Note: Not all calculators work like the one in this section. However, this is a good example of one rather common, inexpensive calculator.

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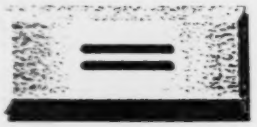
BASIC CALCULATOR OPERATIONS -- MULTIPLICATION

Example #1
Multiplying Two Numbers

- The multiply key is used to multiply two numbers.

- The equals key will display the answer.



- Remember: Press "C" to clear the calculator's display before starting each new problem.

Direction
Use a calculator to work the following example:

Example #1

Multiply 48 by 5 on your calculator.

Enter arithmetic operation →

Press Keys	Display Reads
C	0.
48	48.
X	48.
5	5.
=	240.

Answer: 240

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BASIC CALCULATOR OPERATIONS -- MULTIPLICATION

Example #2
Multiplying More Than Two Numbers

⊙ Enter each number and press the multiply key. *(Reference example #2)*

⊙ Press the *equals* key after entering the final number.

Direction
Use a calculator to work the following example:

Example #2

Multiplying:
Next week Sam is scheduled to work 3 days at $16.00 per hour. His total hours are 18. How much money will Sam make?

Enter arithmetic operation →

Press Keys	Display Reads
C	0.
16	16.
X	16.
18	18.
=	288.

Answer: $288.00

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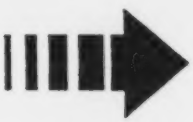
BASIC CALCULATOR OPERATIONS -- MULTIPLICATION

Directions

- Solve the following problems
- Use a calculator
- Write the answers in the blocks



Calculator Discovery

- ➲ The calculator display does not show a [X]sign
- ➲ A final answer appears after you press [=]

MULTIPLY TWO NUMBERS

14	205	81	$1.50	$8.78
x 5	x 2	x 9	x 4	x 10

MULTIPLY MORE THAN TWO NUMBERS

8 x 9 x 10	=	
24 x 10 x 2 x 4	=	
150 x 20 x 4 x 12	=	

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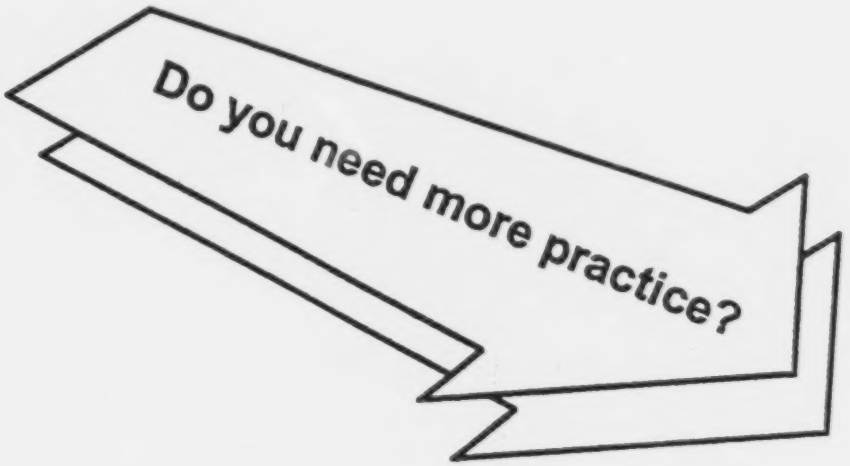
BASIC CALCULATOR OPERATIONS -- MULTIPLICATION



Ask your instructor for the book, Math Skills That Work -- A Functional Approach for Life and Work -- Book 1.

Complete pages 100-106 on *Focus on Calculators*

Note: Not all calculators work like the one in this section. However, this is a good example of one rather common, inexpensive calculator.

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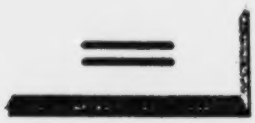
BASIC CALCULATOR OPERATIONS -- DIVISION

Example #1
Divide

- The divide key is used to divide two numbers.

- The equals key will display the answer.



- Remember: Press "C" to clear the calculator's display before starting each new problem.

Direction
Use a calculator to work the following example:

Example #1

Divide 40 by 5 on your calculator, press keys as shown at right.	Press Keys	Display Reads
	C	0.
Enter the dividend →	40	40.
Enter arithmetic operation →	÷	40.
Enter the divisor →	5	5.
	=	8.

Answer: 8

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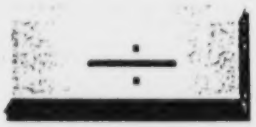
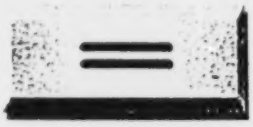
BASIC CALCULATOR OPERATIONS -- DIVISION

Example #2
Divide

- Enter the dividend and press the divide key.



- Press the *equals* key after entering the final number.



Direction
Use a calculator to work the following example:

Example #2

Division:

Sam worked 45 hours last week. Assuming he worked 5 days, how many hours did Sam average each day?

	Press Keys	Display Reads
	C	0.
Enter the dividend →	45	45.
Enter arithmetic operation →	÷	45.
Enter the divisor →	5	5.
	=	9.

Answer: Sam worked an average of 9 hours per day.

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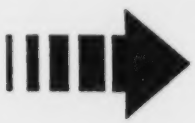
BASIC CALCULATOR OPERATIONS -- DIVISION

Directions

- Solve the following problems
- Use a calculator
- Write the answers in the blocks



Calculator Discovery

- ➲ You cannot divide by 0. Example: 36 ÷ 0
- ➲ The calculator will display an error symbol ➲ an *E* on most calculators.
- ➲ If an error symbol appears on the calculator, press the clear key and repeat the calculation.

Divide		
1.	136 ÷ 8 =	
2.	425 ÷ 5 =	
3.	475 ÷ 25 =	

Divide			
4.	$256.00 ÷ 2	=	
5.	1415 ÷ 5	=	
6.	$150.25 ÷ 25	=	

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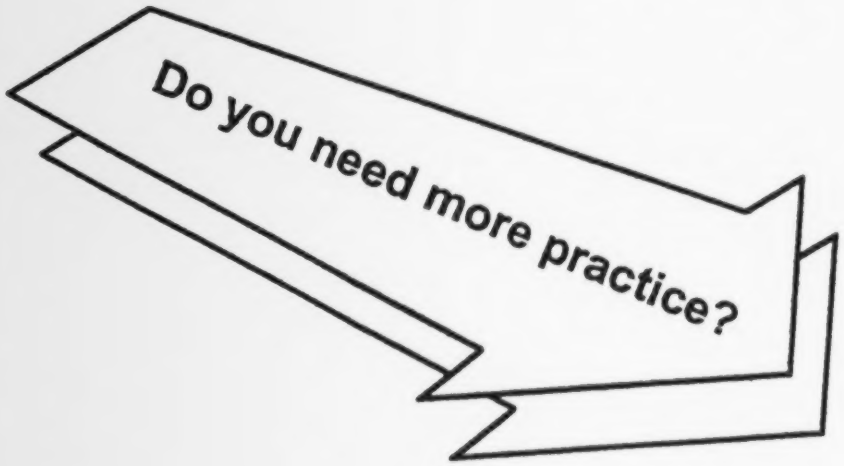
BASIC CALCULATOR OPERATIONS -- DIVISION



Ask your instructor for the book, Math Skills That Work -- A Functional Approach for Life and Work -- Book 1.

Complete pages 136-142 on *Focus on Calculators*

Note: Not all calculators work like the one in this section. However, this is a good example of one rather common, inexpensive calculator.

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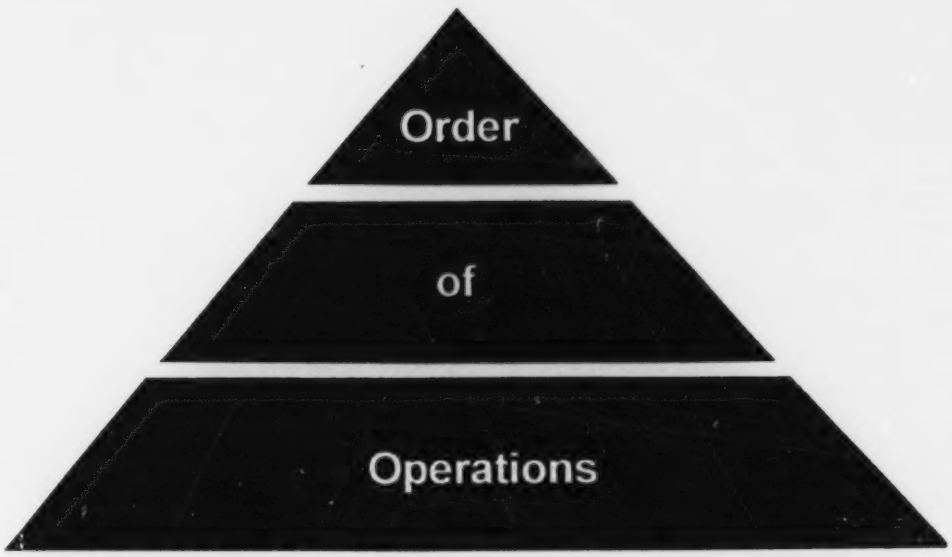
BASIC CALCULATOR OPERATIONS -- ORDER OF OPERATIONS



If a problem includes more than one operation, a specific order must be followed. Steps 1-3 identify this order.

1. Do operations in parentheses ( ) first

2. Next, multiply and divide working from left to right

3. Finally, add and subtract working from left to right

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BASIC CALCULATOR OPERATIONS -- ORDER OF OPERATIONS

EXAMPLE

Solve: $8 + 8 \div 2$

❶ First, do operations in parentheses ( ). There are none.

❷ Do all multiplications and divisions. There is one division. $8 \div 2 = 4$

❸ Do all additions and subtractions. There is one addition. $8 + 4 = 12$

Directions

- Solve the following problems
- Use a calculator

1. $(4 + 2) \times 6 =$ _____

2. $4 + 6 \times 8 =$ _____

3. $14 \times 2 - 10 =$ _____

4. $9 + 18 \div 3 =$ _____

5. $(75 - 25) \div 5 =$ _____

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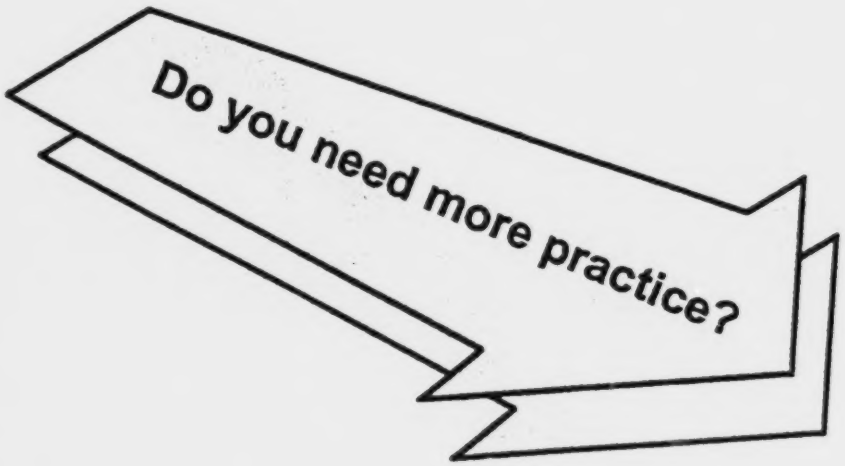
BASIC CALCULATOR OPERATIONS -- ORDER OF OPERATIONS



Ask your instructor for the book, Math Skills That Work -- A Functional Approach for Life and Work -- Book 1.

Complete pages 81-82

Note: Not all calculators work like the one in this section. However, this is a good example of one rather common, inexpensive calculator.

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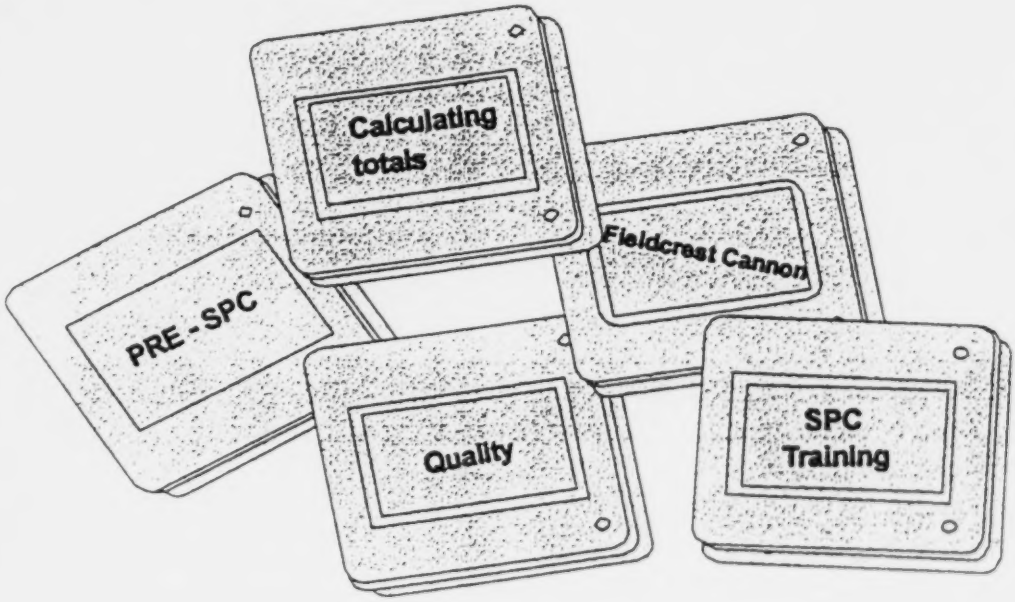

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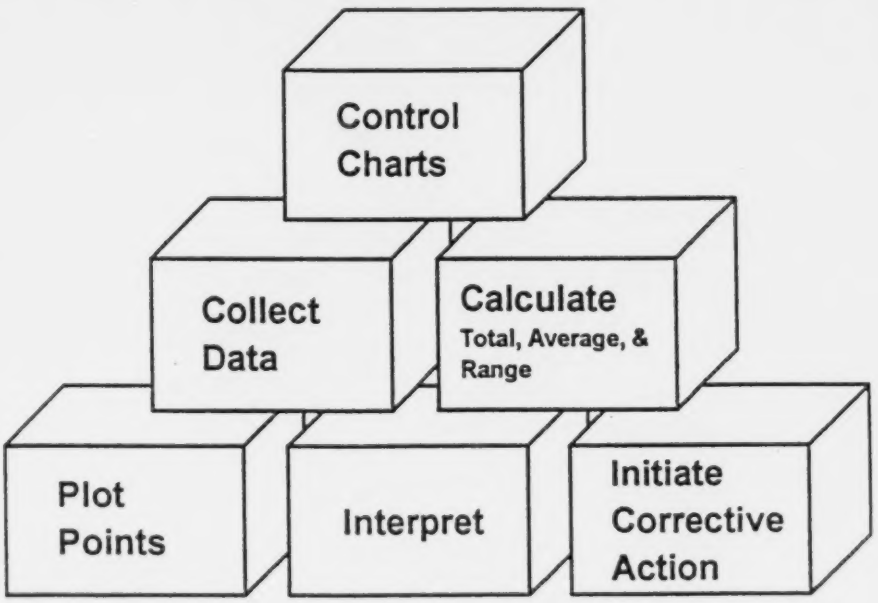
CALCULATING TOTALS

Group Activity: Read and discuss the following text.



Control charts include five essential steps.
Two of these are collecting data and calculating totals, averages, and ranges.

- Associates have access to sample measurements.
- Associates collect sample data from the machines. They record the data.
- Associates use a calculator to calculate totals.

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CALCULATING TOTALS

Directions
- Answer the following questions
- Write your answers on the lines provided

1. How are sample data collected? _____

_____

2. Where do the sample measurements come from? _____

_____

3. Are you comfortable using a calculator? _____

_____

4. Would you rather add the numbers without a calculator? _____

_____

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CALCULATING TOTALS

Directions
- Calculate the following totals
- Use a calculator
- You may refer to page 14

ADD THE SAMPLE MEASUREMENTS TO GET THE SAMPLE'S TOTAL.

Adding Three or More Digits

Sample Measurements	Monday Sample #1	Tuesday Sample #2	Wednesday Sample #3	Thursday Sample #4	Friday Sample #5
1	84.2	87.7	87.2	86.2	88.1
2	83.8	86.9	85.8	85.5	85.7
3	83.3	95.7	76.4	87.3	86.2
4	83.4	85.6	83.3	83.4	84.8
5	+ 84.2	+ 84.4	+ 85.2	+ 85.5	+ 87.7
Sample Total					

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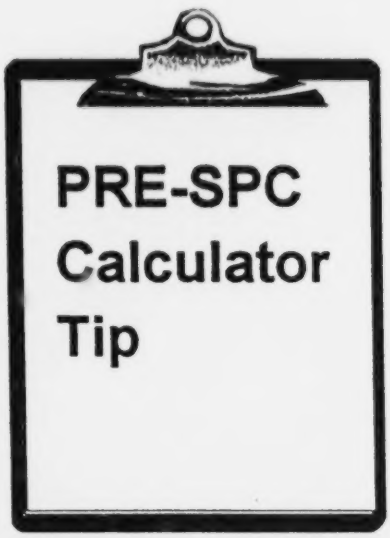
CALCULATING TOTALS



Calculator Tip

If a mistake is made on one entry while adding a list of numbers, the following procedures are recommended:

- *Clear [C] the display to erase the single number*
- *Reenter the number correctly and continue adding*

Directions

- Calculate the total of each sample
- Use a calculator

	84.1	87.2	84.2	83.0	80.8
	77.8	86.9	83.8	83.7	85.8
	88.0	83.7	88.9	84.4	89.9
	89.1	79.9	80.7	89.0	84.9
	82.2	81.1	79.8	78.2	87.2
Total	____	____	____	____	____

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CALCULATING TOTALS

Direction
List at least three problems that can occur when using a calculator.

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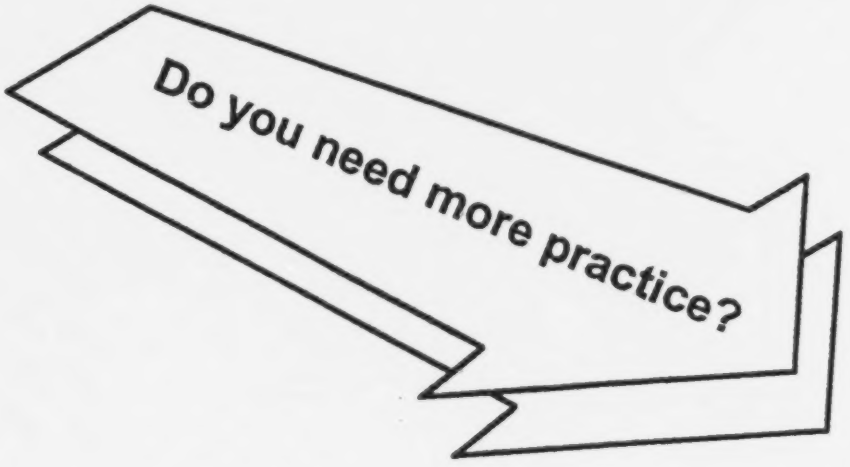
BASIC CALCULATOR OPERATIONS -- CALCULATING TOTALS



Ask your instructor for the book, Math Skills That Work -- A Functional Approach for Life and Work -- Book 2.

Complete pages 44-45 on *Adding Decimals*

Note: Not all calculators work like the one in this section. However, this is a good example of one rather common, inexpensive calculator.

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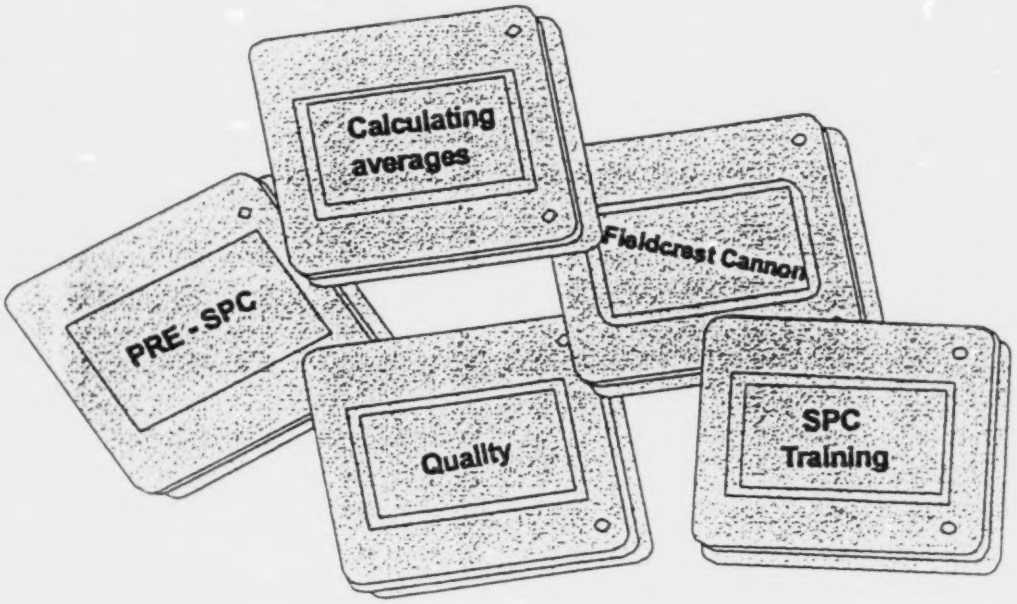

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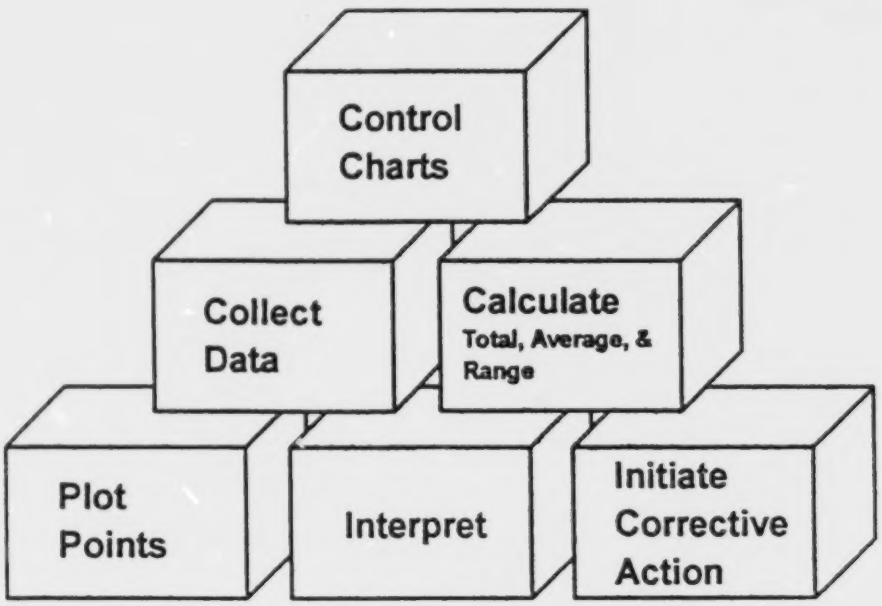
CALCULATING AVERAGES

Group Activity: Read and discuss the following text.



Control charts include five essential steps.
Two of these are collecting data and calculating totals, *averages*, and ranges.
Calculating averages is one of the three primary calculate activities listed.

- Associates will calculate the average of the totals.
- The average is calculated by dividing the sum of the totals by the number of numbers in the set.
- In SPC, work average is represented by the following symbol: $\overline{X}$

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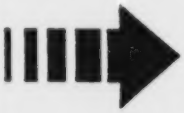
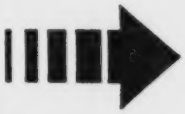
CALCULATING AVERAGES

Direction
- Read the following text



Mean is another word for average.



An average is usually not equal to any of the numbers in the group you add.

The average is often close to the middle value of the group.

How do associates find the average of 2 or more numbers? Follow the two steps below:

Add the numbers (sample measurements) together.

Divide the sum in step 1 by the number of items (numbers) you added.

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Remember, to find the average of a group of numbers, first add the numbers together. Then divide that total (sum) by the number of numbers added.

Example:
Find the average number of hours worked per day.

step 1

Add the group of numbers:

Days		Hours
Monday	=	9
Tuesday	=	10
Wednesday	=	10
Thursday	=	12
Friday	=	9
		50 ➲ *total hours worked*

step 2

Divide the total in step 1 (50 total hours) by the total number of days ➲ 5.

Average Hours

50 ÷ 5 = 10 hours each day

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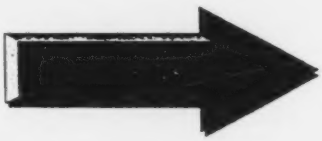
Directions
- Compute the average for each problem below
- Use a calculator



The average is the *middle* of a group of numbers.

1. Find the average loom efficiency for the 4 shifts listed below:

Shift	Efficiency %
A	88
B	87
C	81
D	88

Answer

2. Find the average temperature in the card room for the following days:

Day	Temperature
Monday	80°
Tuesday	82°
Wednesday	89°
Thursday	81°

Answer

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Directions

- Find the average of each group of numbers
- Write the average in the box
- Use a calculator

1.
320
158
75
+103

Average

2.
154
148
40
114
+ 94

Average

3.
558
+ 9

Average

4.
115
380
212
91
6
+ 18

Average

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CALCULATING AVERAGES

Directions

- Add the total
- Calculate the average
- Use a calculator

To find the average:

=> Add the sample measurements

=> Divide that sum by the number of items (numbers) added

Total and Average

Sample Measurement	Monday Sample #1	Tuesday Sample #2	Wednesday Sample #3	Thursday Sample #4	Friday Sample #5
1	84.2	87.7	87.2	86.2	88.1
2	83.8	86.9	85.8	85.5	85.7
3	83.3	95.7	76.4	87.3	86.2
4	83.4	85.6	83.3	83.4	84.8
5	+ 84.2	+ 84.4	+ 85.2	+ 85.5	+ 87.7
Total					
Average					

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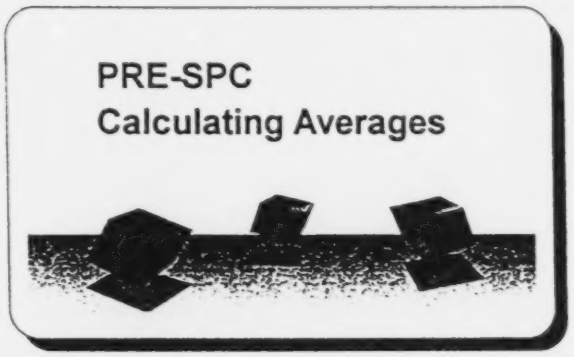
CALCULATING AVERAGES



Directions

- Read the following statements
- Circle the letter **T** if the statement is true and **F** if it is false

T F 1. Average is another word for mean.

T F 2. The average is often close to the last value of the group.

T F 3. The average is calculated by dividing the sum by the number of items in the set.

T F 4. In SPC, work average is represented by the following symbol: $\overline{X}$

T F 5. Median is another word for average.

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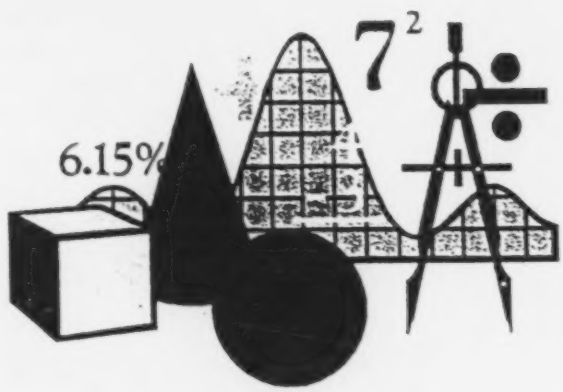
CALCULATING TOTAL AND AVERAGE

Directions

- Calculate the total and average for each sample
- Use a calculator

	84.1	87.2	84.2	83.0	80.8
	77.8	86.9	83.8	83.7	85.8
	88.0	83.7	88.9	84.4	89.9
	89.1	79.9	80.7	89.0	84.9
	82.2	81.1	79.8	78.2	87.2
Total	____	____	____	____	____
Average	____	____	____	____	____



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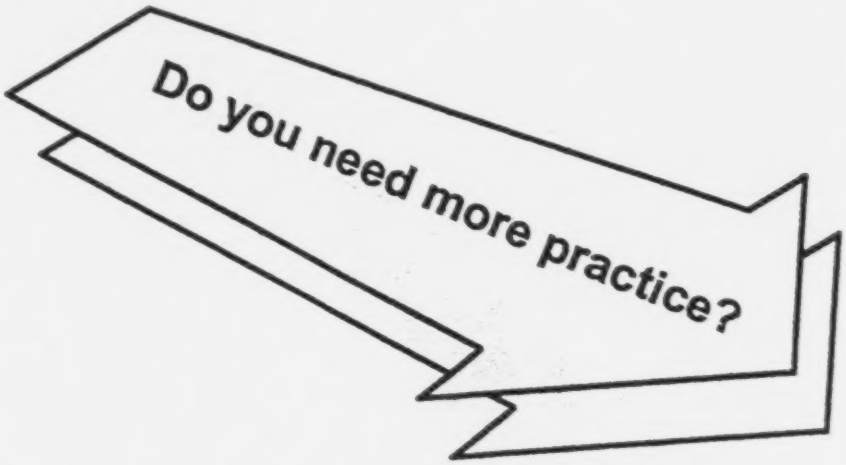
CALCULATING AVERAGES



Ask your instructor for the book, Math Skills That Work -- A Functional Approach for Life and Work -- Book 2.

Complete page 165 -- *The Language of Data Analysis*
Use a calculator to solve the problems.

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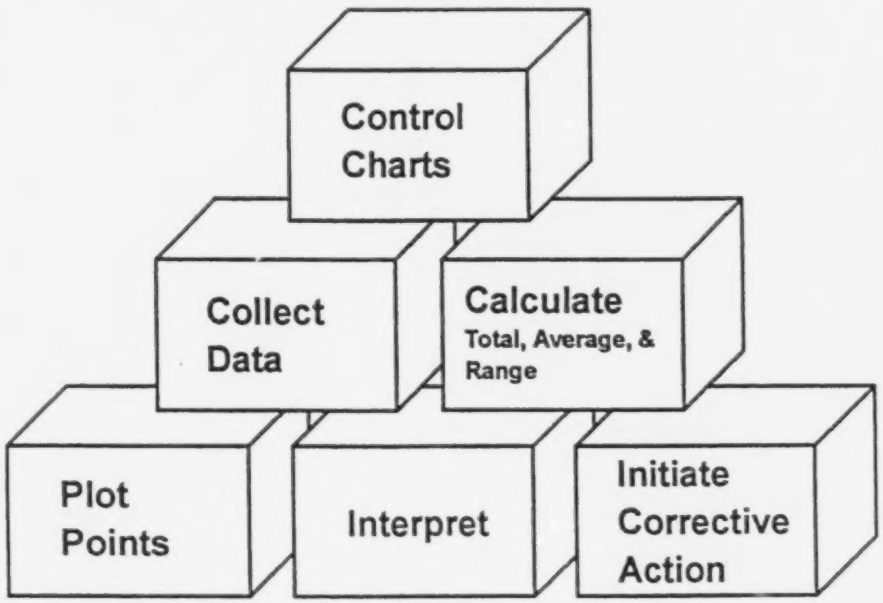
CALCULATING THE PROCESS AVERAGE

Group Activity: Read and discuss the following text.



- Control charts include five essential steps.
- Two of these are collecting data and calculating totals, sample averages, *process averages*, and ranges.

- Associates will calculate the average of the totals.
- The average is calculated by dividing the sum of the totals by the number of numbers in the set.
- The process average is calculated by dividing the sum of the sample averages by the number of samples in the set.
- In SPC, the process average is represented by the following symbol: $\overline{\overline{X}}$

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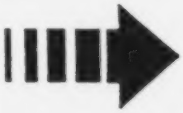
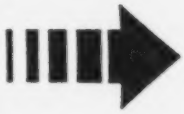
CALCULATING THE PROCESS AVERAGE

Direction

- Read the following text



Mean is another word for average.



A process average is usually not equal to any of the numbers in the group of sample averages.

The process average is often close to the middle value of the sample average group.

How do associates find the process average? Follow the two steps below:

Add the sample averages together.

Divide the sum in step 1 by the number of items (numbers) added.

To find the process average of a group of numbers, first add the sample averages together. Then divide that total (sum) by the number of samples.

Example:

Find the process average of samples 1-5.

step 1

Add the following sample averages:

Sample		Sample Average
#1	=	76
#2	=	74.8
#3	=	72
#4	=	82.2
#5	=	85.0
total sample average		390.0

step 2

Divide the total in step 1 (390 total sample averages) by the total number of samples ➲ 5.

Process Average

$\overline{\overline{X}} = 390.0 \div 5 = 78$

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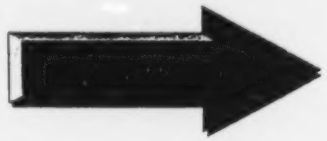
Directions
- Compute the process average
- Use a calculator



The middle of the group can be found by calculating the process average.

Find the process average of the 4 samples listed below:

Sample	$\overline{X}$ Sample Mean
#1	68
#2	77
#3	81
#4	64

Answer

$\overline{\overline{X}}$ = _____

step 1

step 2

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CALCULATING THE PROCESS AVERAGE

Directions

- Read the following statements
- Circle the letter T if the statement is true and F if it is false

T F 1. Mean is another word for average.

T F 2. The process average is the mean of the sample averages.

T F 3. The process average is calculated by dividing the sum of the totals by the number of items in the set.

T F 4. In SPC, process average is represented by the following symbol: $\overline{X}$

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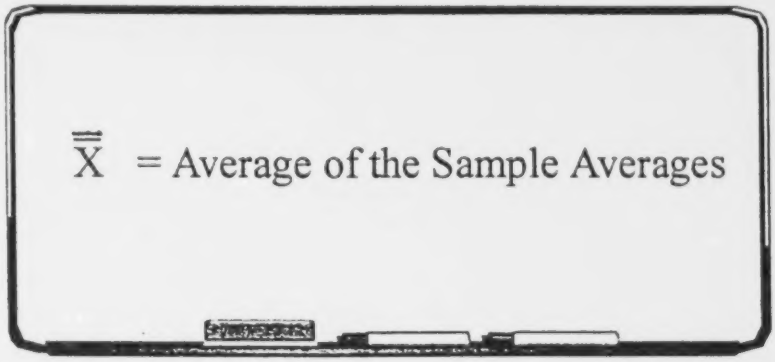
Directions
- Find the process average
- Use a calculator



$\overline{X}$

Sample	Sample Mean
Sample #1	76.0
Sample #2	74.6
Sample #3	75.2
Sample #4	61.6
Sample #5	64.5
Sample #6	74.5
Sample #7	81.0
Sample #8	79.8

Answer

$\overline{\overline{X}}$ = _____

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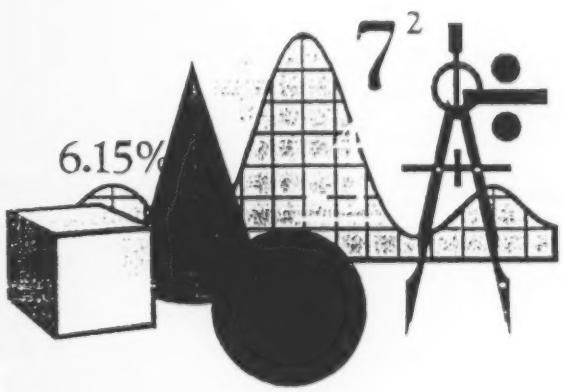
CALCULATING TOTAL, SAMPLE AVERAGE, AND PROCESS AVERAGE

Directions

- Calculate the total, sample average, and process average
- Use a calculator

	Monday	Tuesday	Wednesday	Thursday	Friday
Sample #1	84.1	87.2	84.2	83.0	80.8
Sample #2	77.8	86.9	83.8	83.7	85.8
Sample #3	88.0	83.7	88.9	84.4	89.9
Sample #4	89.1	79.9	80.7	89.0	84.9
Sample #5	82.2	81.1	79.8	78.2	87.2
Total	____	____	____	____	____
Average	____	____	____	____	____

Process Average $\overline{\overline{X}}$ = _____



Fieldcrest Cannon, Inc.
Advanced Technical Preparation (ATP)

CALCULATING THE TOTAL, SAMPLE AVERAGE, AND PROCESS AVERAGE

Directions

- Add the total
- Calculate the sample average
- Calculate the process average
- Use a calculator

To find the process average:

⇒Add the sample averages

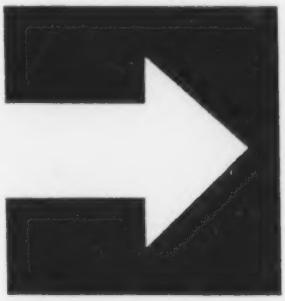
⇒Divide that sum by the number of items (samples) added

Total, Sample Average, and Process Average

Sample Measurement	Monday Sample #1	Tuesday Sample #2	Wednesday Sample #3	Thursday Sample #4	Friday Sample #5
1	84.2	87.7	87.2	86.2	88.1
2	83.8	86.9	85.8	85.5	85.7
3	83.3	95.7	76.4	87.3	86.2
4	83.4	85.6	83.3	83.4	84.8
5	+ 84.2	+ 84.4	+ 85.2	+ 85.5	+ 87.7
Total					
Average					

What is the process average?

$\overline{\overline{X}}$ = _____



PROCESS AVERAGE

$\overline{\overline{X}}$ = Total ÷ Number of Samples

Directions

- Look at the following page *(control chart sample)*
- Circle in red the process average
- Circle in red the sample average for 2/21, 8:00 A.M.
- Circle in red the total for 2/21, 5:00 P.M.

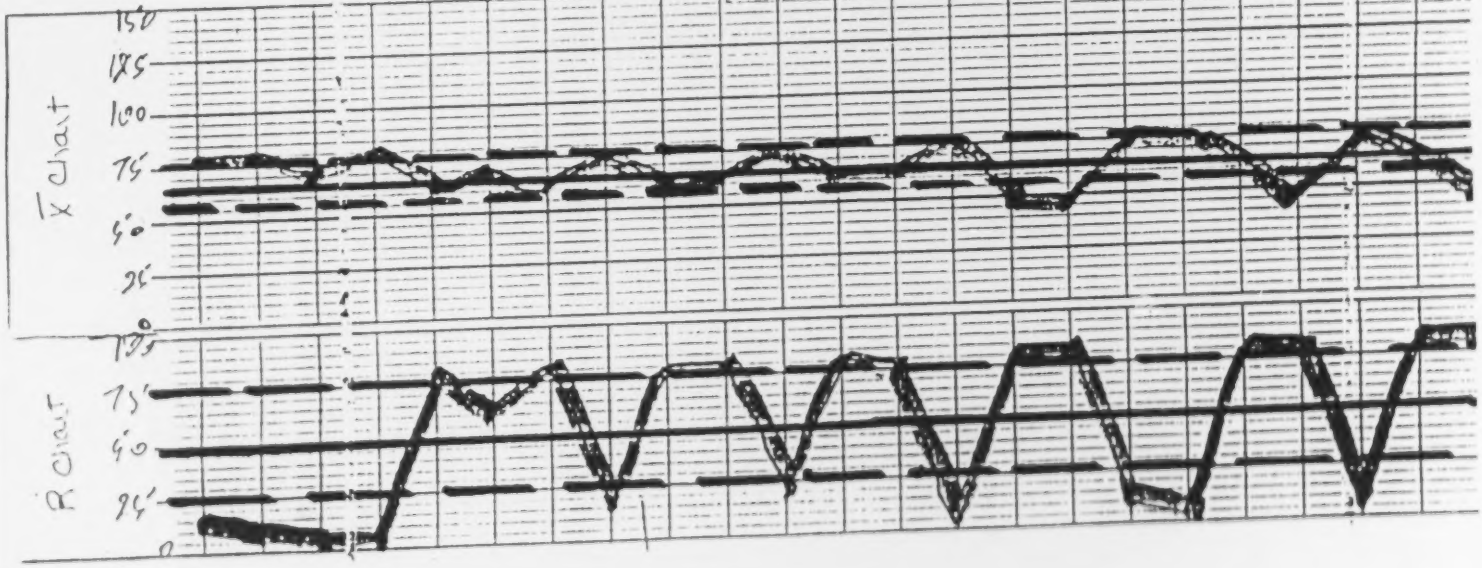
SPINNING - TAIL LENGTH
X̄ - R CHART

FRAME 9
SAMPLE SIZE/FREQUENCY 12 / Filling

AVERAGES CHART X̄ = 64 UCL = 72 LCL = 56
RANGE CHART R̄ = 48 UCL = 74 LCL = 22

DATE	2-21-96	2-21	2-21	2-21	2-21	2-21	2-21	2-22	2-22	2-22	2-22	2-22	2-23	2-23	2-23		2-23	2-23	2-23	2-23	2-23	2-24	2-24	2-
TIME	8:00	8:00 AM	12:00 PM	3:00 PM	5:00 PM	8:00 PM	11:00 PM	2:00 AM	5:00 AM	8:00 AM	11:00 AM	2:00 PM	5:00 PM	8:00 PM	11:00 PM		5:04 PM	2:00 AM	10:00 AM	2:00 PM	5:00 PM	8:00 AM	11:04 AM	2:
ASSOCIATE	J.S	JS	JS	JS	JS	JMP	JMP	JMP	JMP	JMP	JMP	JMP	JMP	JMP	BS		PS	JMP	JMP	JMP	JMP	JMP	JMP	J
SAMPLE 1		71	76	76	80	77	80	77	80	77	80	77	72	72	73	74	75	75	74	79	(69)	75	(80)	8
SAMPLE 2		75	76	73	79	80	72	77	76	74	75	77	81	(73)	(70)	(69)	(65)	(80)	76	82	71	(80)	(80)	7
SAMPLE 3		85	78	74	77	81	80	79	77	77	0	81	77	(68)	(75)	(71)	(75)	77	78	(69)	76	73	75	6
SAMPLE 4		72	75	73	75	76	77	76	76	77	76	76	77	74	79	71	71	76	(68)	(68)	(59)	76	76	
SAMPLE 5		72	73	75	76	78	77	75	64	74	76	76	77	74	79	71	76	76	(68)	(68)	(59)	76	76	
TOTAL		380	376	373	383	383	330	309	373	326	308	363	312	303	381	225	228	378	380	317	230	378	304	2
AVERAGE (X̄)		76	75.2	74.6	76.6	63.6	66	61.8	74.4	61.2	61.6	72.6	62.4	60.6	76.2	44.6	45.6	76	74	63	46	75.6	60.8	6
RANGE (R)		14	7	3	4	19	61	79	15	79	79	16	80	77	5	74	76	6	4	80	79	4	80	7

SHIFT:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	2



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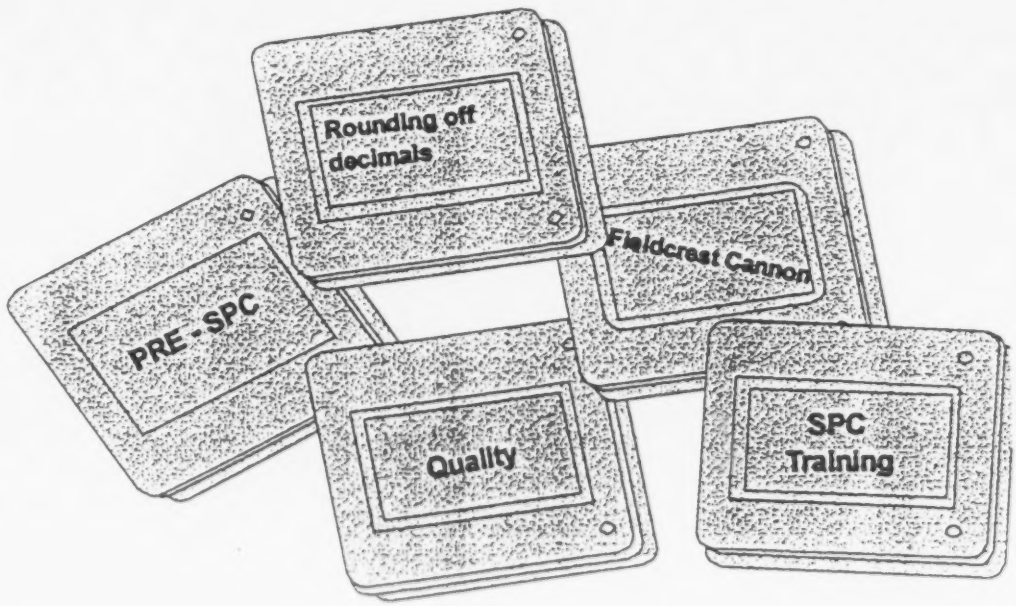

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ROUNDING DECIMALS

Direction
Review the two rules below:

Rule #1

If the number to the right of the place being rounded is 5 or more (5, 6, 7, 8, or 9), round up.

Round to the tenths place
.45 ➲ .5

Rule #2

If the number to the right of the place being rounded is 4 or less (1, 2, 3, or 4), round down.

Round to the tenths place
.42 ➲ .4

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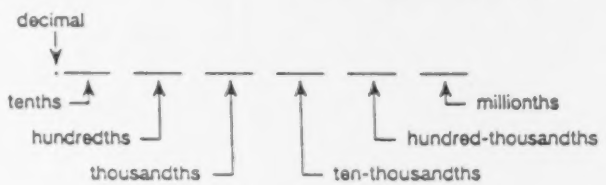
ROUNDING DECIMALS

Group Activity: Read and discuss the following text

In finding the average on an SPC chart, associates will often round numbers to the *tenths* place. This is the first place to the right of the decimal.

Decimal Place Values



.1 one-tenth
.01 one-hundredth
.001 one-thousandth
.0001 one ten-thousandth
.00001 one hundred-thousandth
.000001 one-millionth

Review the following steps:

Round off to the tenths place. The 5 is in the tenths place.	118.<u>5</u>6
Look at the number one place to the right of the tenths place. It is a 6.	118.5<u>6</u>
Six is greater than five so add one tenth to the tenths place and change the hundredths place to 0.	118.<u>60</u> *RAISE*
Drop the 0.	**118.6**

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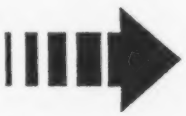
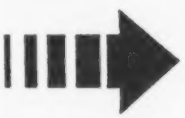
ROUNDING DECIMALS

Directions
- Group activity
- Read and discuss the following text

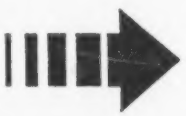


Round off to the tenths place.
The 4 is in the tenths place. 327.4*2*

Look at the number one place to the right of the tenths place. It is a 2. 327.42



Two is less than five so change the two to a zero and do not change the four. 327.40 *LEAVE*



Drop the 0. 327.4

How do associates round decimals? Follow the two rules below:

If the number to the right of the place being rounded is 5 or more (5, 6, 7, 8, or 9), round up

If the number to the right of the place being rounded is 4 or less (1, 2, 3, or 4), round down

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ROUNDING DECIMALS

Directions

- Read the following statements
- Circle the letter **T** if the statement is true and **F** if it is false

T F 1. Rounded decimals are easier to work with.

T F 2. If the number to the right of the place being rounded is 5 or more, round up.

T F 3. If the number to the right of the place being rounded is 4 or more, round down.

T F 4. If the number to the right of the place being rounded is 4 or less, round down.

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ROUNDING DECIMALS

Directions
- Round the numbers to the tenths place
- Write the answer on the line provided

1. 137.863 _____

2. 340.38214 _____

3. 726.58 _____

4. 822.343 _____

5. 327.398 _____

6. 6659.4378 _____

7. 743.4398 _____

8. 222.8914 _____

9. 296.338 _____

10. 131.889 _____

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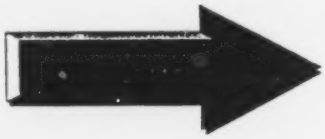
ROUNDING DECIMALS

Directions
- Compute the process average
- Use a calculator
- Round the process average to the tenths place



The middle of the group can be found by calculating the process average.

Find the process average of the 5 samples listed below. Also, round the process average to the tenths place.

$\overline{X}$

Sample	Sample Mean
#1	65.13
#2	77.22
#3	81.878
#4	61.1
#5	69.223

Answer

$\overline{\overline{X}}$ = _____

(Round to tenths place)

Rule #1

Rule #2

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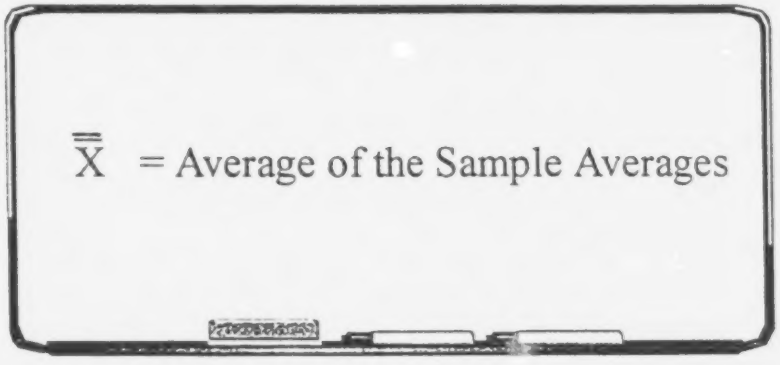
ROUNDING DECIMALS

Directions
- Find the process average
- Use a calculator
- Round the process average to the tenths place



$\overline{X}$

Sample	Sample Mean
Sample #1	76.051
Sample #2	74.623
Sample #3	75.26
Sample #4	61.6
Sample #5	64.515
Sample #6	74.599
Sample #7	81.09
Sample #8	79.811

Answer

$\overline{\overline{X}}$ = _____

(Round to tenths place)

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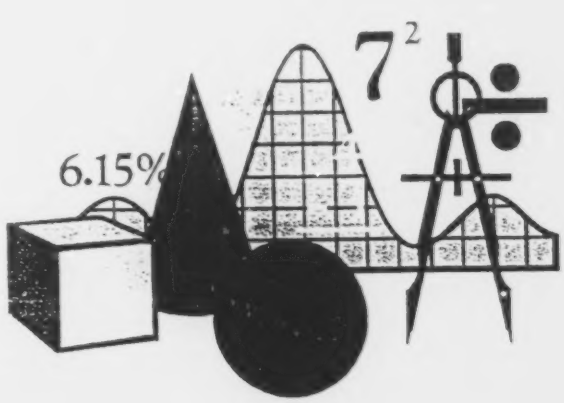
ROUNDING DECIMALS

Directions

- Calculate the total, sample average, and process average
- Use a calculator
- Round the process average to the tenths place

	Monday	Tuesday	Wednesday	Thursday	Friday
Sample #1	84.11	87.29	84.25	83.01	80.81
Sample #2	77.85	86.91	83.85	83.72	85.87
Sample #3	88.09	83.77	88.97	84.43	89.92
Sample #4	89.14	79.93	80.71	89.09	84.91
Sample #5	82.28	81.19	79.82	78.28	87.29
Total	_____	_____	_____	_____	_____
Average	_____	_____	_____	_____	_____

Process Average $\overline{\overline{X}}$ = _____ *(Round to tenths place)*



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ROUNDING DECIMALS

Directions

- Add the total
- Calculate the sample average
- Calculate the process average
- Use a calculator
- Round each average *(Sample and Process)* to the tenths place

Rounding Decimals -- Rules

⇒ If the number to the right of the place being rounded is 5 or more (5, 6, 7, 8, or 9), round up

⇒ If the number to the right of the place being rounded is 4 or less (1, 2, 3, or 4), round down

Total, Sample Average, and Process Average
Rounding Decimals

Sample Measurement	Monday Sample #1	Tuesday Sample #2	Wednesday Sample #3	Thursday Sample #4	Friday Sample #5
1	84.32	87.07	87.52	86.82	88.11
2	83.88	86.79	85.58	85.55	85.17
3	83.13	95.37	76.14	87.43	86.82
4	83.94	85.26	83.23	83.14	84.98
5	+ 84.12	+ 84.14	+ 85.22	+ 85.85	+ 87.74
Total					
Average					
Round the average to the tenths place					

What is the process average? $\overline{\overline{X}}$ = _____ (Round to the tenths place)

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ROUNDING DECIMALS

Direction
Review the two rules below:

Rule #1

If the number to the right of the place being rounded is 5 or more (5, 6, 7, 8, or 9), round up.

Round to the hundredths place
.459 ➲ .46

Rule #2

If the number to the right of the place being rounded is 4 or less (1, 2, 3, or 4), round down.

Round to the hundredths place
.421 ➲ .42

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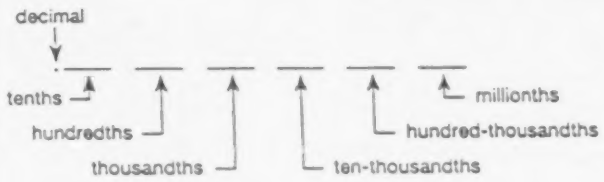
ROUNDING DECIMALS

Group Activity: Read and discuss the following text

There are times that numbers must be rounded to the *hundredths* place. This is the second place to the right of the decimal.

Decimal Place Values



.1 one-tenth
.01 one-hundredth
.001 one-thousandth
.0001 one ten-thousandth
.00001 one hundred-thousandth
.000001 one-millionth

Review the following steps:

Round off to the hundredths or the 2nd decimal place. The 7 is in the hundredths place.	225.4765
Look at the number one place to the right of the hundredths or the 3rd decimal place. It is a 6.	225.4765
Six is greater than five so raise the seven to an eight and change the 65 to 00.	225.4800 *RAISE*
Drop the 00.	**225.48**

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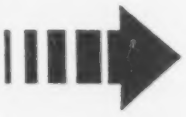
ROUNDING DECIMALS

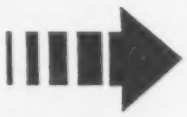
Direction
- Group activity
- Read and discuss the following text

Review the following steps:

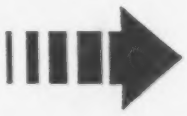


Round off to the hundredths or the 2nd decimal place. The 1 is in the hundredths place. 563.21̲4

Look at the number one place to the right of the hundredths or the 3rd decimal place. It is a 4. 563.214̲



Four is less than five so change the four to a zero and do not change the one. 563.21̲0̲ *Leave*



Drop the 0. **563.21**

How do associates round decimals? Follow the two rules below:

If the number to the right of the place being rounded is 5 or more (5, 6, 7, 8, or 9), round up

If the number to the right of the place being rounded is 4 or less (1, 2, 3, or 4), round down

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ROUNDING DECIMALS

Directions

- Round the numbers to the hundredths place
- Write the answer on the line provided

1. 16.833 _____
2. 9.7855 _____
3. 127.866 _____
4. 822.343 _____
5. 343.8425 _____
6. 9.4378 _____
7. 74.439 _____
8. .8914 _____
9. 26.338 _____
10. 131.8829 _____

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ROUNDING DECIMALS

Directions
- Read the question
- Write your answer on the lines provided
- Write your answer in complete sentences

What are the two rules for rounding decimals?

Rule #1

Rule #2

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ROUNDING DECIMALS

Ask your instructor for the book, Math Skills That Work -- A Functional Approach for Life and Work -- Book 2.

Complete pages 37-39
Rounding Numbers to a Chosen Place Value

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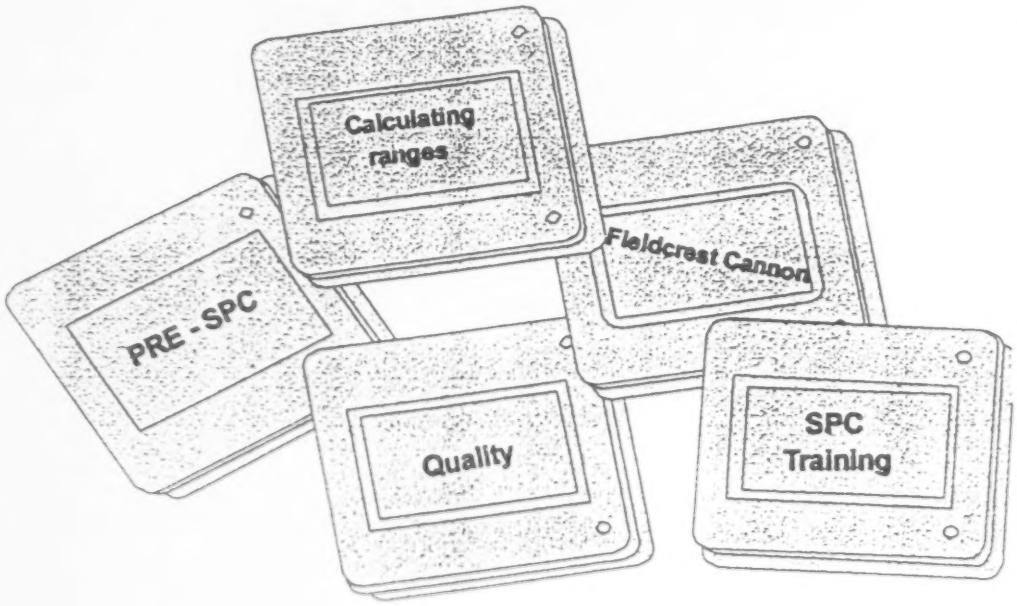

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CALCULATING RANGES

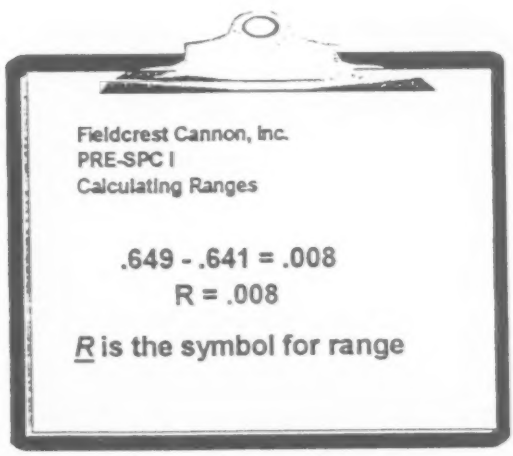
Group Activity: Read and discuss the following text

Associates may be asked to find the range of a group of sample measurements. The range of a group of numbers is the highest number to the lowest number and the result of the difference between them. To find this result, subtract the lowest from the highest number.

Find the range of the following numbers:

21
15
30
17
45

- The highest number is 45
- The lowest number is 15
- The range is from 45 to 15, or
- 45 - 15 = 30 *(30 is the range of the group of numbers)*



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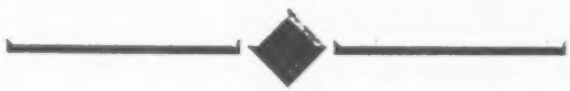
CALCULATING RANGES



Directions

- Read the following statements
- Circle the letter **T** if the statement is true and **F** if it is false

T F 1. The range is calculated by adding the highest number in a group to the lowest number.

T F 2. The symbol used to represent the range is ***R***.

T F 3. If the highest number in a group is 25 and the lowest number is 20, the range is 5.

T F 4. The range is the difference between the largest value and the smallest value in a group of numbers.

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CALCULATING RANGES

- Circle the highest number in each group
- Circle the lowest number in each group
- Calculate the range of each group of numbers
- ***R*** is a symbol for range

1. 36, 52, 88, 31, 28 ***R*** = _____

2. 55, 115, 101, 225, 88, 95 ***R*** = _____

3. 66.6, 88.5, 115.6, 58.9, 99.15 ***R*** = _____

4. 145, 188, 220, 335, 178, 558, 551, 600 ***R*** = _____

5. 432.6, 234.5, 432.4, 333.1, 237.4, 198.9 ***R*** = _____

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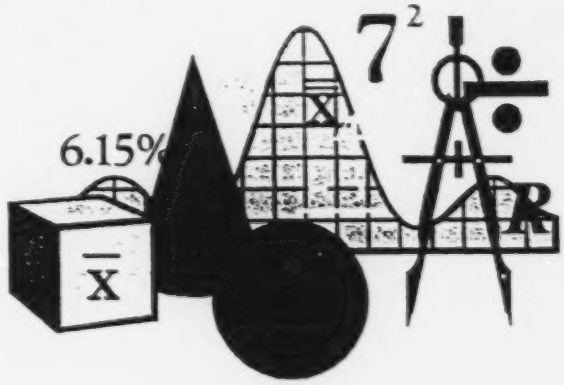
CALCULATING RANGES

Directions
- Match the following terms with the correct symbol
- Write the letter of the term on the line provided

_____	$\overline{\overline{X}}$	a. range of a sample
_____	R	b. average of a sample
_____	$\overline{X}$	c. process average *(average of the averages)*



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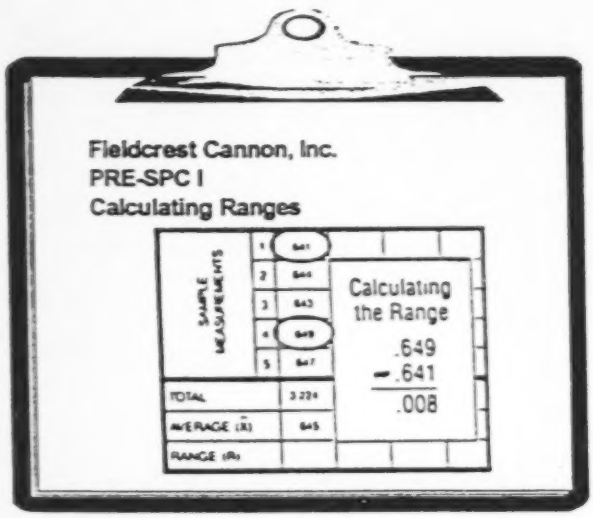
CALCULATING RANGES

Directions

- Circle the highest and lowest numbers
- Calculate the range ***(R)***



Sample	Sample Mean
Sample #1	76.051
Sample #2	74.623
Sample #3	75.26
Sample #4	61.6
Sample #5	64.515
Sample #6	74.599
Sample #7	81.09
Sample #8	79.811

$R =$ _____

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CALCULATING RANGES

Directions

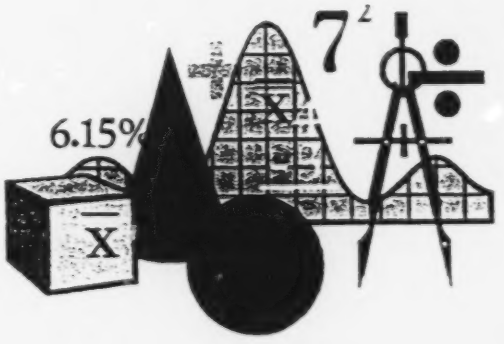
- Circle the highest and lowest numbers *(If you need help comparing decimal fractions, reference Contemporary's Math Skills That Work, Book 2, page 8)*
- Calculate the total, average, and range for each sample
- Calculate the process average (round to the tenths place)
- Use a calculator
- Write your answers on the lines provided

2.34	6.33	.135	5.88
2.02	6.15	.088	5.15
2.81	6.88	.517	5.09
2.42	6.21	.333	5.18
5.21	6.59	.175	5.19

Total	_____	_____	_____	_____
Average	_____	_____	_____	_____
Range	_____	_____	_____	_____

Process Average = _____

Calculate the range of a group of numbers by subtracting the lowest number from the highest number.



Fieldcrest Cannon, Inc.
Advanced Technical Preparation (ATP)

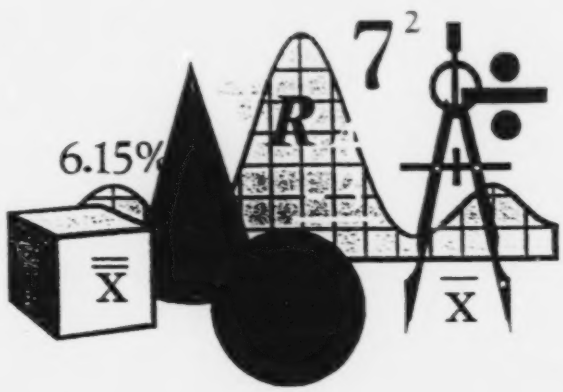
CALCULATING RANGES

Directions

- Circle the highest and lowest numbers
- Calculate the total, sample average, range, and process average
- Use a calculator

	Monday	Tuesday	Wednesday	Thursday	Friday
Sample #1	84.11	87.29	84.25	83.01	80.81
Sample #2	77.85	86.91	83.85	83.72	85.87
Sample #3	88.09	83.77	88.97	84.43	89.92
Sample #4	89.14	79.93	80.71	89.09	84.91
Sample #5	82.28	81.19	79.82	78.28	87.29
Total					
Average					
Range					

Process Average $\overline{\overline{X}}$ = _____ *(Round to tenths place)*



Fieldcrest Cannon, Inc.
Advanced Technical Preparation (ATP)

CALCULATING RANGES

Directions

- Add the total
- Calculate the sample average
- Calculate the range for each sample measurement
- Calculate the process average
- Use a calculator

Calculating Ranges

- Calculate the range by subtracting the lowest number from the highest number
- Range is represented by the symbol ***R***

Total, Sample Average, Range, and Process Average

Sample Measurement	Monday Sample #1	Tuesday Sample #2	Wednesday Sample #3	Thursday Sample #4	Friday Sample #5
1	84	87	87	86	88
2	83	86	85	85	85
3	83	95	76	87	86
4	83	85	83	83	84
5	+ 84	+ 84	+ 85	+ 85	+ 87
Total					
Average					
Range					

What is the process average? $\overline{\overline{X}}$ = _____

Fieldcrest Cannon, Inc.
Advanced Technical Preparation (ATP)

Statistical Process Control (SPC)
PRE-SPC Answer Key

Page 1 (0 points)
No grade

Page 2 (1 points)
Check #2

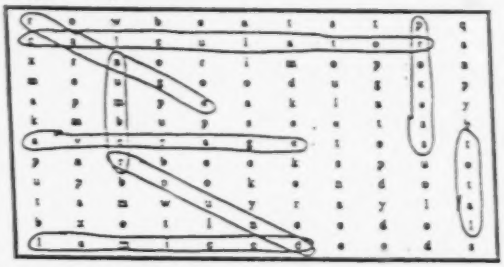
Page 3 (0 points)
No grade

Page 4 (2 points)
1. Circle C 2. Circle D

Page 5 (0 points)
No grade

Page 6 (1 points)
Place an X over color code, price products, and cut advertising costs

Page 7 (2 points)



Page 8 (0 points)
No grade

Page 9 (2 points)
Instructor's discretion in grading

Page 10 (0 points)
No grade

Page 11 (0 points)
No grade / practice only

Page 12 (0 points)
No grade / practice only

Page 13 (0 points)
No grade / practice only

Fieldcrest Cannon, Inc.
Advanced Technical Preparation (ATP)

Statistical Process Control (SPC)
PRE-SPC Answer Key

Page 14 (0 points)
No grade / practice only

Page 15 (10 points)

Adding Two Numbers

58 173 507 2105 $7.57

Adding Three Numbers

46 282 922 $2,723.00 $11.10

Page 16 (0 points)
No grade

Page 17 (0 points)

Page 18 (0 points)

Page 19 (4 points)

Subtracting One Number From Another

24 140 216 $790.00 $8.22

Subtract Two or More Numbers

46 54 $53.13

Page 20 (0 points)

Page 21 (0 points)

Page 22 (0 points)

Page 23 (4 points)

Multiply Two Numbers

70 410 729 $6.00 $87.80

Multiply More Than Two Numbers

720 1,920 144,000

Page 24 (0 points)

Page 25 (0 points)

Page 26 (0 points)

Page 27 (4 points)

1. 17 2. 85 3. 19 4. $128.00 5. 283 6. $6.01

Page 28 (0 points)

Page 29 (0 points)

Page 30 (4 points)

1. 36 2. 52 3. 18 4. 15 5. 10

Page 31 (0 points)

BEST COPY AVAILABLE

Fieldcrest Cannon, Inc.
Advanced Technical Preparation (ATP)

Statistical Process Control (SPC)
PRE-SPC Answer Key

Page 32 (0 points)

Page 33 (2 points)
Answers will vary -- instructor discretion

Page 34 (4 points)
Sample totals 418.9 440.3 417.9 427.9 432.5

Page 35 (4 points)
Totals 421.2 418.8 417.4 418.3 428.6

Page 36 (2 points)
Instructor discretion in grading

Page 37 (0 points)

Page 38 (0 points)

Page 39 (0 points)

Page 40 (0 points)

Page 41 (2 points)
1. 86 2. 83°

Page 42 (2 points)
1. 164 2. 110 3. 283.54. 137

Page 43 (5 points)

	Sample #1	Sample #2	Sample #3	Sample #4	Sample #5
Total	418.9	440.3	417.9	427.9	432.5
Average	83.78	88.06	83.58	85.58	86.5

Page 44 (2 points)
1. T 2. F 3. T 4. T 5. F

Page 45 (2 points)

Total	421.2	418.8	417.4	418.3	428.6
Average	84.24	83.76	83.48	83.66	85.72

Page 46 (0 points)

Page 47 (0 points)

Page 48 (0 points)

Fieldcrest Cannon, Inc.
Advanced Technical Preparation (ATP)

Statistical Process Control (SPC)
PRE-SPC Answer Key

Page 49 (0 points)

Page 50 (1 point)
Process average = 72.5

Page 51 (2 points)
1. T 2. T 3. T 4. F

Page 52 (1 point)
Process average = 73.4

Page 53 (3 points)

	Monday	Tuesday	Wednesday	Thursday	Friday
Total	421.2	418.8	417.4	418.3	428.6
Average	84.24	83.76	83.48	83.66	85.72

Process average = 84.172

Page 54 (3 points)

	Monday	Tuesday	Wednesday	Thursday	Friday
Total	418.9	440.3	417.9	427.9	432.5
Average	83.78	88.06	83.58	85.58	86.5

Process average = 85.5

Page 55 & 56 (1 point)
Circle Process average = 64 Average = 76 Total 383

Page 57A - 58 (0 point)

Page 59 (2 points)
1. T 2. F 3. F 4. T

Page 60 (2 points)

1. 137.9	2. 340.4	3. 726.6	4. 822.3	5. 327.4
6. 6659.4	7. 743.4	8. 222.9	9. 296.3	10. 131.9

Page 61 (1 point)
Process average = 70.9 *(rounded to tenths place)*

Page 62 (1 point)
Process average = 73.4 *(rounded to tenths place)*

Fieldcrest Cannon, Inc.
Advanced Technical Preparation (ATP)

Statistical Process Control (SPC)
PRE-SPC Answer Key

Page 63 (3 points)

	Monday	Tuesday	Wednesday	Thursday	Friday
Total	421.47	419.09	417.60	418.53	428.80
Average	84.294	83.818	83.52	83.706	85.76

Process average = 84.2

Page 64 (3 points)

	Monday	Tuesday	Wednesday	Thursday	Friday
Total	419.39	438.63	417.69	428.79	432.82
Average	83.878	87.726	83.538	85.758	86.564
Rounded average	83.9	87.7	83.5	85.8	86.6

Process average = 85.5

Page 65A - 66 (0 points)

Page 67 (2 points)

1. 16.83 2. 9.79 3. 127.87 4. 822.34 5. 343.84
6. 9.44 7. 74.44 8. .89 9. 26.34 10. 131.88

Page 68 (1 point)

Instructor discretion in grading
> 5 round up
< 5 round down

Page 69 - 70 (0 points)

Page 71 (2 points)

1. F 2. T 3. T 4. T

Page 72 (2 points)

1. Circle 88 & 28 R=60
2. Circle 225 & 55 R=170
3. Circle 115.6 & 58.9 R=56.7
4. Circle 600 & 145 R=455
5. Circle 432.6 & 198.9 R=233.7

Page 73 (1 point)

C, A, B

Page 74 (1 point)

Circle 81.09 & 61.6 R=19.49

Fieldcrest Cannon, Inc.
Advanced Technical Preparation (ATP)

Statistical Process Control (SPC)
PRE-SPC Answer Key

Page 75 (3 points)

Circle high #	5.21	6.88	.517	5.88
Circle low #	2.02	6.15	.088	5.09
Total	14.8	32.16	1.248	26.49
Average	2.96	6.432	.2496	5.298
Range	3.19	.73	.429	.79

Process average = 3.7

Page 76 (3 points)

Circle high #	89.14	87.29	88.97	89.09	89.92
Circle low #	77.85	79.93	79.82	78.28	80.81
Total	421.47	419.09	417.6	418.53	428.8
Average	84.294	83.818	83.52	83.706	85.76
Range	11.29	7.36	9.15	10.81	9.11

Process average = 84.2

Page 77 (3 points)

Total	417	437	416	426	430
Average	83.4	87.4	83.2	85.2	86
Range	1	11	11	4	4

Process average = 85.04

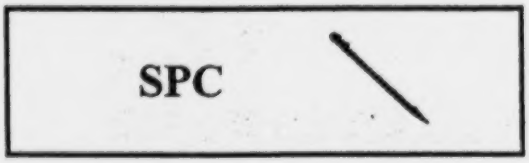
Maximum Points 100
90% Mastery Level

Fieldcrest Cannon, Inc.
Advanced Technical Preparation (ATP)

PRE-SPC

PRETEST

Fieldcrest Cannon, Inc.
Advanced Technical Preparation (ATP)



Direction
Circle the best answer.

1. SPC is an acronym for

   a. statistical progress center

   b. standard process center

   c. statistical process control

   d. standard process control

2. The associates' responsibilities in working with SPC include

   a. record data on the process

   b. alert management of situations that are out of control

   c. provide recommendations on situations that could result in defective parts or products

   d. all of the above

Fieldcrest Cannon, Inc.
Advanced Technical Preparation (ATP)

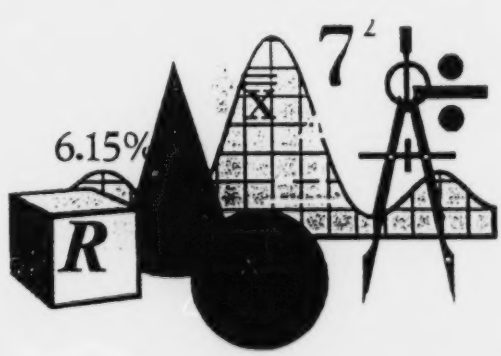
Directions

- Circle the highest and lowest numbers for each sample
- Calculate the total, average, and range
- Calculate the process average *(round to the tenths place)*
- Use a calculator
- Write your answers on the lines provided

Sample #1	Sample #2	Sample #3	Sample #4
2.34	6.33	.135	5.88
2.02	6.15	.088	5.15
2.81	6.88	.517	5.09
2.42	6.21	.333	5.18
5.21	6.59	.175	5.19

Total	_____	_____	_____	_____
Average	_____	_____	_____	_____
Range	_____	_____	_____	_____

Process Average = _____



Fieldcrest Cannon, Inc.
Advanced Technical Preparation (ATP)

PRE-SPC Pretest
Answer Key

1. c (5 points)

2. d (5 points)

Each sample total, average, and range (6 points -- *total 72 points*)
Process average (18 points)

	Sample #1	Sample #2	Sample #3	Sample #4
	2.34	6.33	.135	5.88
	2.02	6.15	.088	5.15
	2.81	6.88	.517	5.09
	2.42	6.21	.333	5.18
	5.21	6.59	.175	5.19
Total	14.80	32.16	1.248	26.49
Average	2.96	6.432	.2496	5.298
Range	3.19	.73	.429	.79

Process Average = 3.7

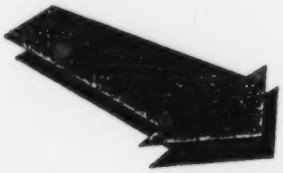
Total possible points = 100

Fieldcrest Cannon, Inc.
Advanced Technical Preparation (ATP)

PRE-SPC

POSTTEST

Fieldcrest Cannon, Inc.
Advanced Technical Preparation (ATP)



GLOBAL COMPETITION

Directions
- Answer the following question
- Mark a ✓ beside the correct answer

What will help Fieldcrest Cannon become a strong competitor in the world market?

_____ 1. Old technology with old machinery

_____ 2. Sell only in the United States

_____ 3. Upgraded associate skills and new technology

_____ 4. New technology and more down time

Fieldcrest Cannon, Inc.
Advanced Technical Preparation (ATP)

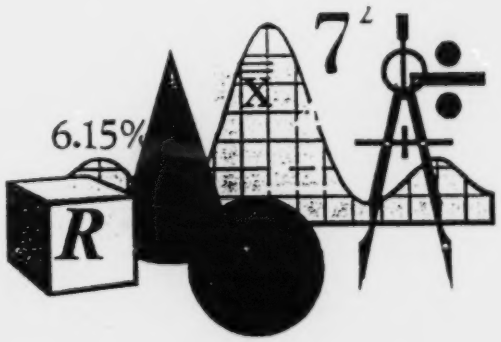
Directions

- Circle the highest and lowest numbers for each sample
- Calculate the total, average, and range
- Calculate the process average *(round to the tenths place)*
- Use a calculator
- Write your answers on the lines provided

Sample #1	Sample #2	Sample #3	Sample #4
2.34	6.33	.135	5.88
1.99	6.15	.088	5.01
2.81	6.88	.517	5.09
2.42	5.06	.029	5.18
5.21	6.59	.175	5.19

Total	_____	_____	_____	_____
Average	_____	_____	_____	_____
Range	_____	_____	_____	_____

Process Average = _____



Fieldcrest Cannon, Inc.
Advanced Technical Preparation (ATP)

PRE-SPC Posttest
Answer Key

1. Upgrade associate skills and new technology #3 (10 points)

Each sample total, average, and range (6 points -- *total 72 points*)
Process average (18 points)

	Sample #1	Sample #2	Sample #3	Sample #4
	2.34	6.33	.135	5.88
	1.99	6.15	.088	5.01
	2.81	6.88	.517	5.09
	2.42	5.06	.029	5.18
	5.21	6.59	.175	5.19
Total	14.77	31.01	.944	26.35
Average	2.954	6.202	.1888	5.27
Range	3.22	1.82	.488	.87

Process Average = 3.7

Total possible points = 100